The

# Electrical Review

VOL. C. MAY 20, 1927. No. 2,582.

THE OLDEST ELECTRICAL PAPER. ESTABLISHED 1872.

Published every FRIDAY, Price 6d.

*Chairman:* H. ALABASTER

*Technical Editor:* A. H. ALLEN, M.I.E.E. *Joint Managing Directors:* G. H. ALABASTER. E. A. GATEHOUSE M.I.E.E., A.M.INST.C.E. *Commercial Editor:* A. H. BRIDGE.

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OFFICE: 4, LUDGATE HILL, LONDON, E.C.4.

Telegraphic Address: "AGEKKAY, CENT., LONDON," Code, A B C. Telephone No.: Central 7072 (Three Lines).

The "Electrical Review" is the recognised medium of the Electrical Trades, and has by far the Largest Circulation of any Electrical Industrial Paper in Great Britain.

SUBSCRIPTION RATES, Postage Free: United Kingdom, £1 14s. 8d.; Canada, £1 12s. 6d. Colonial and Foreign, £2 1s. 6d. per annum. Cheques and Postal Orders (on Chief Office, London) to be made payable to THE ELECTRICAL REVIEW, LIMITED, and crossed "Midland Bank, Newgate Streets Branch."

**For List of Foreign Agents for the ELECTRICAL REVIEW see Advertisement Supplement.**

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# Electricity Supply Tariffs.

THE question of tariffs is one that we have always with us; it will only be finally solved when the load curve becomes a horizontal line and electricity can be sold for all purposes at the same price—a flat rate of less than a halfpenny per kilowatt-hour. In the meantime no plan by which we can make a nearer approach to that desirable consummation should be neglected. In many respects the two-part tariff which we have consistently advocated, and which has been adopted in principle in the Act of 1926, is the most suitable for general application; it inherently tends to improve the shape of the load curve, and cheapens the supply of electricity to those consumers whose demands are very economically met—namely, those who make a low maximum demand and yet consume a large quantity of energy. Such consumers' loads have a high load factor of their own.

As we have pointed out, there is a still more desirable class of consumer—the one whose demand falls entirely within the "off-peak" hours, and thus improves the general load factor by helping to fill up the valleys in the load curve. A consumer of this type may reasonably be relieved of the kilowatt charge and be supplied at the net kilowatt-hour rate, for no appreciable proportion of the standing charges can be debited to his account. But an arrangement of this kind usually involves the provision of a time switch, restricting the use of the supply to certain specified hours; the objection is not so much to the switch as to the time, which is usually a fixed period or periods, the supply being cut off at other hours. A modified system which lessens this inconvenience is that which employs a two-way switch, enabling, say, the cooker to be used when the water-heater is cut off, and *vice-versa*, but never both together. Incidentally, it may be observed that any domestic load which is to be moulded into a desirable form must necessarily include some long-hour application such as the heating of water, or thermal storage cooking such as Dr. A. Ekström has reported to be widely used in Sweden. And this brings us to the point of this article, for it is to Dr. Ekström that we are indebted for particulars of a system of charging for

electricity for home use which also is in vogue in Sweden, but which appears to be entirely new to this country. It partakes of the nature of a two-part tariff, a contract tariff, and an alternative-use tariff, and attains its end by simple means—a watt-hour meter combined with a switch.

The basis of the system is the division of the domestic load into two parts—an optional or declared kilowatt "basis" demand, for which a fixed annual charge is made (per kilowatt-year), no matter how many hours' use the consumer makes of it; and a "supplementary" load comprising all energy consumed at a higher demand rate than the "basis" wattage, for which a charge is made per kilowatt-hour. For example, a consumer may declare his demand at 500 watts, for which an annual charge of £7 may be made; he may, if he likes, take 500 watts for 8,760 hours a year without further payment, but experience in Stockholm shows that a longer period of use than 7,000 hours is never reached, and in that case the charge corresponds to a price of ½d. per kWh. But if the consumer switches on a device consuming, say, 1,000 watts, he is charged for all energy used above the 500-watt line at a much higher price per kWh—say, 1½d. Assuming that a water-heater or thermal-storage cooker forms part of the load, the function of the switch is periodically to cut off the heater when the demand exceeds the "basis" wattage until the excess energy used above the line is compensated for—partially, if not wholly—by a corresponding deficiency below the line.

The exact mode of operation of this system will be explained more fully on a later occasion; in the meantime we would once more extend to Dr. Ekström our thanks for his disinterested efforts to hasten the development of electricity supply in this country as in his own. Recently he has lectured on the uses of electricity before the North-Eastern Centre of the Institution of Electrical Engineers, and the Farmers' Club; he is now, we believe, fulfilling lecture engagements at Berlin and Rome, and he read a paper before the Société Française des Electriciens in Paris not long ago. As an apostle of electrical development he takes high rank, and there can be no doubt that his instructive addresses will do much to increase the adoption of electricity in the home and on the farm.

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**The Central Scotland Electricity Scheme.**

MUCH interest has been aroused north of the Border by the publication of the Central Scotland Electricity Scheme by the Central Electricity Board, which affects 42 authorised undertakers in the area, and involves eventually the closing of 30 generating stations. By this time next year it is estimated that nearly a quarter of a million sterling will have been expended on the standardisation of frequency, out of the total of three millions allocated to this purpose during the next six years. Our Glasgow correspondent informs us that Bailie J. D. Higgins, Convener of the Glasgow Corporation Electricity Department, says there may be an immediate increase in efficiency and a large expansion of electrical service as a result of the scheme, and it may prove of great advantage to the agricultural community. He is of opinion, however, that it will not result in lower rates to electricity consumers for some considerable time. Even a great increase in consumption, he says, may not give reduced rates to consumers in the near future, as increased capital expenditure will first require to be met. Electricity will perhaps be cheaper after that is done, but the immediate tendency may be to increase the price to the consumer.

Dr. S. Parker Smith, Professor of Electrical Engineering at the Royal Technical College, Glasgow, supports the scheme, but cautions the public against expecting too much from it. He points out that much pioneer work has to be done in putting the scheme into operation, and it will be a number of years before it can be completed. Its benefits in the way of reduced tariffs will be least felt in the big manufacturing centres, for there the rates are already low. The advantage will be experienced chiefly in the areas at present without electricity supply, or with a supply from small stations.

Lord Provost High, of Dundee, says that one effect of the scheme will be to relieve the Council of the cost of further extensions of the electricity station. The Convener of the Corporation Electricity Committee says that the Department has been invited to put forward any observations it has to make on the subject. In the meantime, he says, much doubt has been expressed as to the city's position, but it will be a long time before the scheme affects Dundee at all.

In Dunfermline, the site of one of the generating stations that will be retained temporarily in service—that of the Fife Electrical Power Co., Ltd.—the scheme has aroused much interest. Mr. George A. Nicolson, secretary of the company, states that his directors have not yet fully analysed the scope of the new scheme, but, broadly speaking, he thinks that under it electricity will eventually be cheaper.

Sir Andrew Duncan, chairman of the Central Electricity Board, and Mr. A. Page, chief engineer, were in Scotland last week, and called informally upon Councillor Shaw, Convener of the Edinburgh Corporation Electricity Committee, and Mr. E. Seddon, chief engineer of the Electricity Department, with whom they discussed the new scheme in private. Sir Andrew also visited Dundee. It is pointed out that Edinburgh is in a much better position with regard to the scheme than are the stations in the west, where changes of frequency and voltage will have to be made in order to procure standardisation. Edinburgh is the largest "exporter" of electrical power in Scotland, and it is owing to the large turnover which will be made as a result of this bulk supply that it is expected consumers in Edinburgh will ultimately benefit by reduced charges made possible by increased production.

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**Electricity in the Irish Free State.**

THE Irish Free State Government's Electricity Supply Bill has now passed through committee stage in the Senate, and the report and third reading stages are being taken this week. It is expected that the Bill will receive the Royal Assent forthwith. No change of outstanding importance was made by the Senate except that it was agreed that the date for the Board of Control to show a balance of revenue and costs should occur in 1932, and that the actual date should be fixed by the Minister for Industry and Commerce, in consultation with the Board. The Minister (Mr. McGilligan) stated that in 1929 the Board would be in a position to reduce the charges for electricity all over the country and to get revenue that would make the Shannon scheme a paying proposition in 1932.

Cork Chamber of Commerce recorded approval of the Government's action in taking over municipal and other undertakings to work in connection with the Shannon scheme, provided that fair market values were paid. There is, however, no hope that the Government will now accept any suggestion of this sort, nor is there any prospect of an amending Bill being introduced later. The question of confiscation is being freely discussed at meetings of various parties in preparation for the General Election for the Dail (Lower House) next month. Business people appear to be more amenable than they were a few weeks ago, and the view is generally held that the Government's proposal for absorbing the local undertakings must be accepted as a vital part of the Shannon enterprise.

Of course, the original differences of opinion remain among those directly concerned in the electricity industry, and probably more will be heard about the confiscation policy when the election is over and the position of the present Executive Council (Cabinet) is made clearer. The constitution of the Board of Control is much discussed, but no definite step is likely to be taken just now in the selection of members. The Board, it may be recalled, will have plenary powers, and will not be subject to Parliamentary control or criticism.

# Electro-Farming.

**The ultra-violet ray treatment of live-stock on a commercial scale; some particulars of the apparatus available for the purpose, and of the results obtained.**

By R. BORLASE MATTHEWS, Wh.Ex., A.M.Inst.C.E., M.I.E.E., F.R.Ae.S.

A STABLE tip, direct from the horse's mouth (for those persons who have not made a mathematical investigation of betting—as those who have done so will not bet), is to back an animal that gets the benefits of a summer seaside holiday in the midst of winter, through the medium of ultra-violet rays. This treatment is now being applied by several enterprising racing stables. The method is being kept as secret as possible, since it is considered that horses thus irradiated are brought into better condition during the winter racing season, and thus stand a better chance of winning. Very little information is, however, available concerning the manner of application, as the present users do not wish competing race-stables to follow their example—which is in itself excellent evidence as to the good results that they must be obtaining. The fact that the practice of utilising ultra-violet rays is being adopted for this and other purposes is of considerable interest to electricity supply undertakings as a new development calling for the use of still more current.

Recognition has always been given to the sun as the great life-giver and healer. Sun worship has been practised in many countries for centuries; it has also been stated that the cradle of the human race was in some tropical country, so it is claimed that mankind was evolved in the sun and largely by its agency. During the past few years a great deal of interest has been taken in heliotherapy, owing, no doubt, to the discovery that, of the sun's rays, the most beneficial are the short invisible ones, and that these can be reproduced by artificial means. As natural sunshine varies in its intensity and is not obtainable at will, the artificial sources are far more satisfactory, especially during the winter months in Northern climes. The artificial sunlight work carried out in many of the hospitals and doctors' consulting rooms of this country shows that the medical profession is awake to the immense potentialities of this treatment, and the results obtained prove that the practice is now an accepted therapeutic process, which is playing an important *rôle* in medical science. While a great deal of publicity has been given to the treatment of human beings by this means, little is heard of the use of these rays for the treatment of birds and animals, though a considerable amount of research work has already been done and some very definite results obtained. Some particularly valuable work has been done at the Rowett Research Institute, Aberdeen, the Kansas State Agricultural College, and the Wisconsin College of Agriculture, where it has been demonstrated that irradiation is as effective in the case of birds and animals as it is in its application to human beings.

Commercial experimental work has been carried out on the writer's all-electric farm at East Grinstead with both the mercury-vapour and the arc types of lamps. During the past two years he has had a large number of inquiries from pig and poultry farmers on the subject. Several of these enterprising farmers have purchased and are using ultra-violet lamps commercially.

### Units of Measurement.

In this article, the wave-length measurements are given in Angström (Å) units, though other terms are sometimes used; those commonly employed are:—

| Unit. | Millimetres. | Relative length. | Symbol. |
|---|---|---|---|
| Angstrom. | One ten-millionth. | 1 | Å |
| Milli-micron. | One millionth. | 10 | $m\mu$ |
| Micron. | One thousandth. | 100 | $\mu$ |

So that a measurement could be given as 2,700 Å, or 270 $m\mu$.

The visible spectrum of sunlight consists of wavelengths from 3,900 Å to 7,700 Å. Above this range come, of course, the heat rays (8,000 Å to 20,000 Å). The actual wavelengths of ultra-violet rays used for artificial irradiation range from 3,900 Å down to 1,850 Å. Ultra-violet rays fall to 120 Å where the X-ray region begins; however, air absorption commences at 1,850 Å, hence the part below is of no practical value (fig. 1). Owing to absorption by dust and suspended moisture, the rays of the sun are not as effective for many purposes as the artificially-produced rays. The ultra-violet rays of greatest therapeutic power appear to be those between 2,300 Å and 2,900 Å. The ultra-violet part of the solar radiation, after passing through the atmosphere, is chiefly between 2,900 Å and 4,000 Å. Thus it is not so effective.

### Lamps.

There are three principal methods of providing ultra-violet rays artificially:—

(1) By means of a vacuum or gasfilled incandescent filament lamp made of glass which is transparent to the rays.

(2) Arc lamps, with (*a*) carbon, or (*b*) impregnated carbon, or (*c*) tungsten electrodes.

(3) The quartz mercury-vapour lamps: (*a*) atmospheric type; (*b*) vacuum type.

The ultra-violet rays of the sun can also be obtained indoors by using a special window glass containing a large proportion of quartz, which permits rays down to 2,700 Å to pass through. Rays below 3,000 Å cannot pass through ordinary glass, and it is these rays that are intimately associated with metabolism and growth. It is very important to keep the surfaces of this glass scrupulously clean on both sides by the aid of spirits of wine, for the slightest deposit will screen the rays.

There is a difference of opinion, at the present time, as to the best type of lamp, for the mercury-vapour lamp is deficient in the biologically active wave-lengths, but has a number of isolated bands of very short wavelengths near the region of atmospheric absorption. The spectrum of the tungsten lamp falls short at 3,500 Å; and the carbon arc is poor in the shorter of the short wavelengths. The tungsten arc is probably the most satisfactory, as it gives a more nearly continuous spectrum band to 2,130 Å. Tungsten positive and tungsten-cored negative carbons give excellent results. The longer wavelengths are more penetrating, hence are probably of more value for treating the thicker and hair-covered skins of animals, though the therapeutical effect of the shorter wavelengths is the greater. The

choice of a reflector needs a little care, as the silvered type reflects only 30 per cent., the nickel reflector 45 per cent., and the silicon reflector 75 per cent., of the ultra-violet rays.

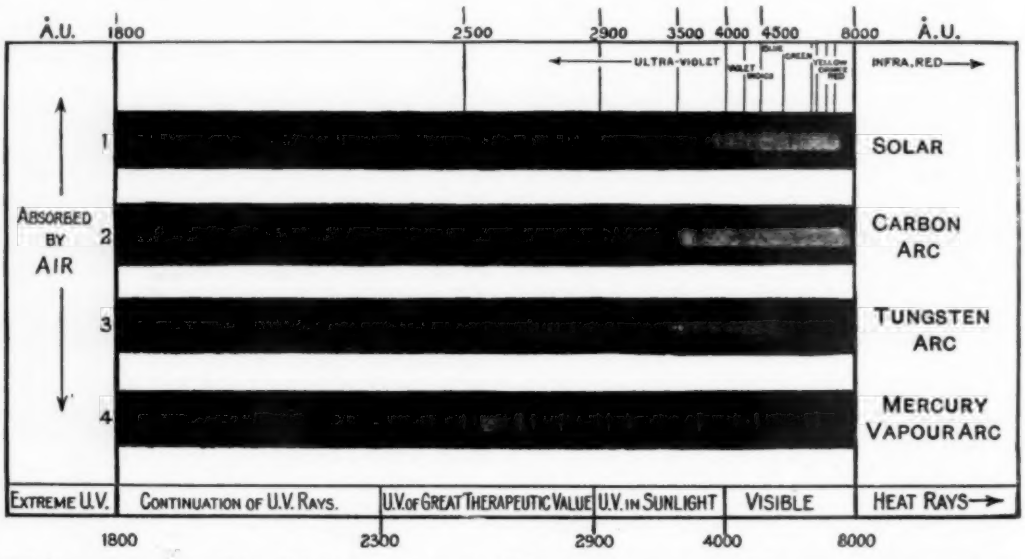
1.—*Incandescent Filament Lamps.*—A test with the spectroscope, made by the writer, upon a standard gasfilled lamp indicated that the ultra-violet ray emanation within the required range was negligible. This is corroborated in an interesting report prepared by the Research Department of the General Electric Co., Ltd.

Experiments have been made with quartz-glass enclosing bulbs. In the early stage, trouble was caused by the occlusion of gases. This has now been overcome, and commercial lamps of "vitaglass" are now available in wattages of 150 and 300. The 300-watt bulb fits the standard G.E.S. lampholder used with ordinary bulbs of this power, and is listed at 27s. 6d. The 150-watt bulb fits the ordinary bayonet lampholder, and is listed at 15s. 6d. Bulbs of lower power are not made. These bulbs are not likely to produce beneficial effects in ordinary use for lighting.

The first grade is used when a long exposure and weak intensity of ultra-violet radiation is required, while the second is stronger in ultra-violet radiation and more effective for a shorter exposure. The third gives a strong ultra-violet radiation of a more penetrating power than either A or B.

Impregnated carbon electrodes for arc lamps cost 1s. 9d. per pair; tungsten- or iron-cored carbons are 3s., with an increase of about 25 per cent. in each case for alternating-current carbons. Tungsten-steel electrodes cost 7s. 6d. per pair, while tungsten electrodes are 4s. 6d. per inch. These are the retail prices quoted by the medical supply houses, and many readers will notice that there is an appreciable difference between these prices and those to which the electrical engineer is accustomed.

It is interesting to note that this adoption of ultra-violet treatment has given a new lease of life to the previously discarded arc lamp. Manufacturers are finding it worth their while to overhaul many of the old arc lamps that were not long ago about to be consigned to the scrap-heap, for almost any type of arc lamp is




(1) Continuous spectrum of sunlight. (2) Spectrum of a carbon arc. (3) Spectrum of a tungsten arc. (4) Spectrum of a mercury-vapour arc.

**Fig. 1.—A Comparison of the Spectra of Different Sources of Light.**

The writer has not yet had an opportunity of either testing these lamps or seeing their characteristic spectrum, though he has seen them in operation. If the spectrum is satisfactory, this is probably the most practical form of lamp for the farmer—if he keeps the exterior scrupulously clean, by wiping the glass with spirits of wine before using. The very short rays are not emitted by these bulbs, so that the use of goggles for the protection of the eyes is not essential. The ultra-violet radiation is, however, rather weak, necessitating long exposure at a short distance.

2.—*Arc Lamps.*—When a single arc is used, a series resistance has, of course, to be employed in the circuit, with a consequent wastage of energy. However, one firm of manufacturers now produces a series four-carbon arc lamp for 220-volt circuits, which can be operated without a large resistance, the current being used to produce an increase in the quantity of radiation.

The current consumption of the arc lamps employed to produce ultra-violet rays varies from 5 to 45 amps., according to size of carbons and whether they are impregnated or not.

The impregnated carbons are often graded according to their wavelengths; the three usual grades are:—

| | | |
|---|---|---|
| Grade A | ... | 2,950 to 3,100 Å. |
| Grade B | ... | 2,900 to 3,500 Å. |
| Grade C | ... | 2,400 to 3,575 Å. |

suitable, if provision is made for preventing the particles of hot carbon from falling on to the treated subject. An effective method of doing this is to provide a glass cup fixed at the bottom of the lamp. It is essential that this cup be manufactured of the special glass, transparent to the rays, or the vital rays will not pass through. Alternatively, sheets of special glass, transparent to the rays, may be placed underneath.

When the lamps are only required for the treatment of live-stock, the hand-feed or non-automatic type can be employed, as they are only required for periods of ten to fifteen minutes at a time.

A new appliance for the treatment of chickens has lately been developed. A hand-fed arc lamp is fixed on a portable frame, which can be placed over the feeding space of the chickens. A piece of the special glass, transparent to the rays, is placed between the lamp and the floor, so as to catch any sparks falling from the arc and yet permit the full action of the ultra-violet rays. In order to prevent fracture of this valuable glass, it is cut in strips, as is done with the protecting front glass of searchlight projectors.

Enclosed-type arc lamps would not be practicable unless the enclosing glasses were made of a substance transparent to the rays, and even then it is doubtful whether a deposit would not form on the inside of the glass and prevent the passage of the rays.

*(To be continued.)*

# Electrical Aids for the Deaf.

## The Application of Radio Apparatus to the Relief of Deafness.

By C. M. R. BALBI, A.M.I.E.E., A.C.G.I.

THE subject of "acoustics" is one in which our knowledge has not yet been co-ordinated; hence, those whose professions require them to deal with this branch of physics are apt to judge matters from their own standpoint. Thus the "telephone engineer" states that he is satisfied if he can enable two subscribers to converse without misunderstanding, or, to put it in his own terms, "set up a standard of 100 per cent. intelligibility."

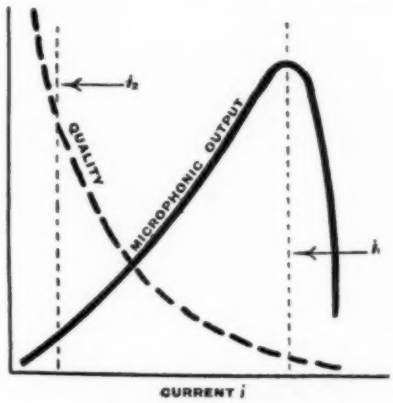



Fig. 1.—Microphone Characteristics.

This ideal can easily be said to have been reached, yet the "radio engineer" will tell you that broadcasting, which is of far better quality than ordinary telephony, has not nearly reached perfection yet. I specially point out this diversity of views as I want to emphasise that for natural reproduction something more than intelligibility is necessary. This fact has been particularly brought to my attention in the case of "electrical apparatus for the deaf." Quite a number of deaf people, who ordinarily wear an electrical aid to increase their range of hearing, have told me that they notice a great difference between their own instruments and broadcast speech and music supplied to them through a wireless receiver and amplifier.

A person who was deaf once expressed the matter to me in the following way: "I can hear so much better on the wireless, and although I can understand everything that is said with the help of my electrical aid, there are distracting buzzing noises which are absent in the wireless."

Now this strikes at the root of the matter, and I will therefore explain why an "electrical aid"* has this inherent defect, and will later discuss a means by which it may be overcome, albeit with limitations.

The question largely depends on the microphone. It is known that a microphone usually consists of a variable resistance made of carbon which can be acted upon by variations of pressure due to sound waves. By passing a small current through the microphone a small microphonic output is obtained, and as the current is increased the microphonic output is increased also. Theoretically modulation is obtainable to any degree of intensity by simply increasing the current, but a limit is soon reached when the modulation attains a maximum and if pushed further it begins to diminish rapidly. The relation is illustrated in fig. 1.

Naturally the microphonic output is greatest when the current is $i_1$,† but so far I have said nothing about quality; this falls off rapidly as the current is increased. Therefore, there is a choice of great intensity or high quality. The two do not go together.

Now, as the apparatus for the deaf needs to be powerful, it seems to be the general practice among manufacturers of electrical aids for the deaf to operate their microphones at the current $i_1$, but for broadcasting, where great attention has to be paid to quality, the microphone is operated at the far smaller current $i_2$, which is later amplified by suitable valve amplifiers.

There is no doubt that manufacturers of electrical aids for the deaf are right in abandoning quality (such as is understood by the radio engineer), and availing themselves of the greatest microphone output that can be obtained, as by so doing they are able to construct a set which is both light and powerful, and it is wonderful what an effective aid can be constructed from parts that only weigh a few ounces complete.

This is what the vast majority of users require—something light and inconspicuous that they can carry about with them, and so long as they are able to hear and understand well, they are willing to waive the matter of quality.

The only alternative is to do as the radio engineer does, and operate the microphone at $i_2$ and then amplify; but, of course, this greatly complicates matters and adds to both the bulk and expense of the

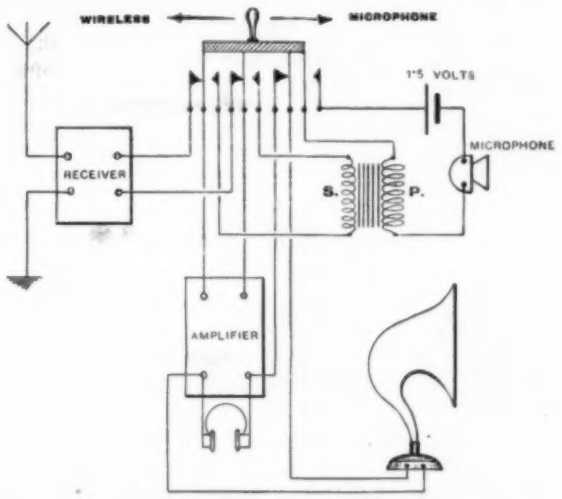



Fig. 2.—Schematic Wiring Diagram.

apparatus. It would be of no use operating a microphone at $i_2$ without amplification, as the intensity would be too weak for the deaf to benefit by it.

* It is now generally understood that an "electrical aid" refers to an electrical appliance for the deaf, consisting of a small battery, microphone, and receiver.

† $i_1$ differs considerably for various types of microphones, but in many cases is about 100 milliamperes.

Hitherto it has not usually been thought desirable to construct an aid for the deaf on the lines of the broadcasting studio microphone, on account of the expense of the apparatus and its bulkiness; but now that the radio experimenter has proved his ability in the construction of telephonic apparatus to such a marked degree, and the valve amplifier (the most expensive item required) usually forms part of his equipment, an apparatus of this description could be made up for very little outlay. It is therefore only a question whether in such cases the circumstances are such that the disadvantage of bulkiness might be outweighed by the improved quality of reproduction and the pleasure given thereby.

The circumstance I have in mind is that of a wireless amateur who has in his possession a wireless receiver and a powerful amplifier with which he operates a loud-speaker. He has a deaf relative staying in the same house as himself, who spends much of her time in an armchair by the fireside and who is too deaf to hear the loud-speaker or general conversation.

To make life more tolerable, a pair of headphones have been connected to the output terminals of the amplifier in parallel with the loud-speaker; in this way enjoyment is brought to the sufferer in the form of broadcast reception, but for general conversation an electrical aid is used concerning which an opinion has already been expressed.

My object is to show how, with the aid of a suitably-constructed microphone and the existing amplifier system, quality comparable with that of the broadcast reception may be obtained. For this reason I will pass on to describe the operation of a system which will enable such a patient to listen at will either to general conversation, with the advantage of more natural reception, or to ordinary broadcast reception. The details of the system are illustrated in fig. 2. It will be seen that when the switch is thrown over to "wireless," the circuit is such that the headphones are connected to the wireless set and the patient is able to hear broadcast reception over the same circuit as she did before. The loud-speaker is also connected so that it can be heard by any other members who wish to listen. However, when the switch is thrown over to the other direction (*i.e.*, to "microphone"), the wireless set is cut out and the special microphone which is coupled through a transformer is now connected in at the input of the amplifier.*

The sounds that reach the microphone are conveyed through the amplifier to the same pair of headphones that were previously being used for "listening in," so that the only action that the patient has to perform to change over from "wireless" to "general conversation" is to throw this switch.

It will be observed that when the headphones are connected for general conversation, the loud-speaker is disconnected. This is absolutely necessary—otherwise there would be what is termed a "howl," which is really an acoustic reaction between the loud-speaker and the microphone.

Fig. 3.—Microphone Case.

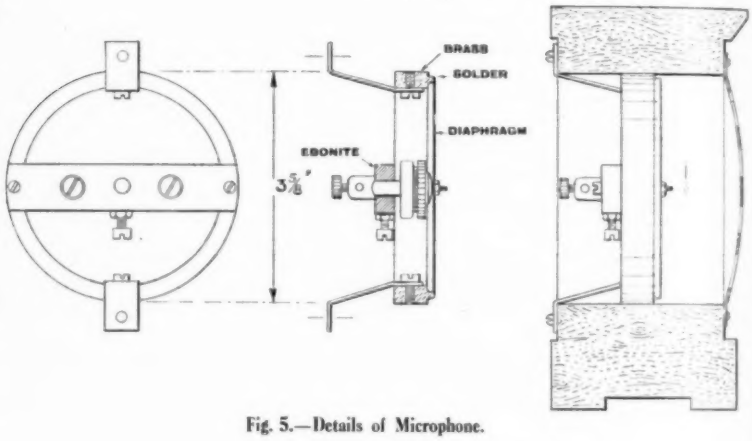



Fig. 5.—Details of Microphone.

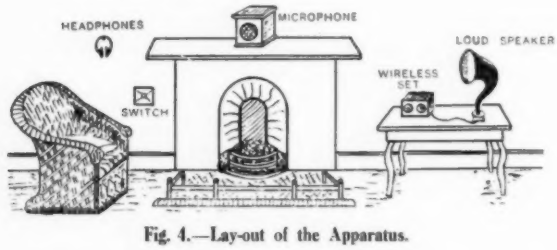



Fig. 4.—Lay-out of the Apparatus.

A little reflection will show that there is no objection to cutting out the loud-speaker when general conversation is taking place; in fact, in most cases it is found to be more pleasant to do so.

So far as can be seen, there is no advantage in making such a system portable. As has been previously suggested, the patient will spend most of her time in a chair by the fireplace in the living-room where she is wont to "listen in." For any other occasions her electrical aid is available and should be sufficient.

I have, therefore, come to a point where I shall have to consider where to install the various pieces of apparatus in question in the living-room of an ordinary house. I will commence with the microphone.

For acoustic reasons it is found desirable to locate the microphone on the mantleshelf and, therefore, some appropriate mounting is required. A very suitable form is a wooden clock case, as shown in fig. 3. An ornamental front has been fitted to finish off the design, the bore, 3⅜ in., is a standard, and into this the microphone can be fitted.

The only other item that requires remark is the location of the multi-point switch which is needed for the purpose of changing-over from broadcast reception to the reception of general conversation; it should be within easy reach of the patient's chair.

A suitable way of laying out the rest of the apparatus is shown in fig. 4, which may be taken as a general guide.

I have now to consider the microphone itself. It is the only part that is likely to present any difficulty to those who may attempt to build up a system for themselves on these lines. Any kind of microphone will produce results, but I have laid down a clause that this microphone must provide natural reproduction. Special precautions, besides the most important

* It was the practice two or three years ago to build the receiver and amplifier separately, but nowadays the set is usually made up as a complete unit. However, the task of opening a circuit at the point where the l.f. amplification begins should offer no difficulty to a person who understands his circuit.

one of working at low microphone current, have to be taken in order that this object shall be attained. If the current through the microphone is of a small enough order, then the variations of current will closely correspond to the variations of pressure that are put on the carbon elements. Now all would be well if it were not for the question of resonance. In almost every form of microphone it is arranged that the sound waves shall exert their minute variations of pressures through the medium of a diaphragm. It is essential that this diaphragm should be non-resonant, otherwise the resonance will be communicated to the microphonic elements and the ill effects revealed in the quality of the reception.

There are two practical ways of overcoming resonance: one is to make the part very heavy in comparison with the forces acting upon it, and the other is to employ damping.

As the diaphragm itself should be as light as possible, I should employ the latter method, but in order that no other part should be acted upon by the sound waves and produce resonance, they should be made as heavy as possible. For this reason it will be found that a light metal diaphragm (afterwards suitably damped) secured about its periphery to a heavy annular ring of brass, makes a very suitable arrangement to which to fix the microphone capsule as illustrated in fig. 5.

The microphone capsule that has been shown is of the type employed by the British Post Office for its standard telephone transmitters, but as these are rather difficult to procure, a slightly different type which will be found equally satisfactory and more easily obtainable is the "Skindeveken."

The diaphragm should be made of hard-drawn brass about 5/1,000th of an inch thick, which is about the thickness of writing paper. It will be noticed that the section of the heavy brass annular ring is pointed; this has been specially arranged so as to facilitate the securing of the diaphragm, which has to be soldered. The diaphragm should be stretched as tightly as possible while it is being soldered, so that it is tight like a drum when it is finished. A light piece of metal with a hole through it should be sweated to the centre where the diaphragm is to be secured to the capsule by its locking nut.

The annular ring, which will require turning, should be of 3⅝ in. outside diameter, so that it just fits the case,

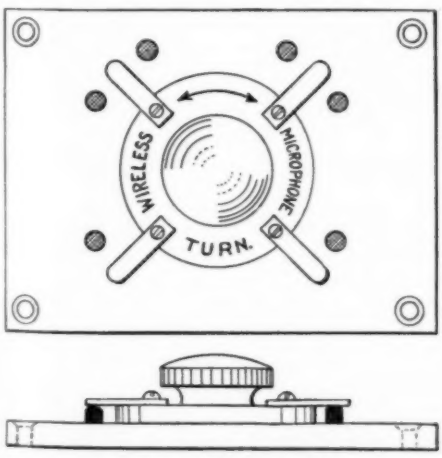



Fig. 6.—A Multi-point Switch.

the bore of which should be also 3⅝ in., which is a standard for clock cases. The case should be of solid wood as shown.

The ebonite cross-bar fixing for the microphone capsule and terminals will easily be understood from the diagram; the capsule should be fitted so that there is no pull on the diaphragm when the fixing screw is tightened up.

When the model has been completed up to this stage, it will be found to be very resonant for the reasons that have already been given, and the next process is to "damp" the diaphragm, as it is termed, to overcome this effect.

The method of damping to be employed is very important; the best arrangement is to cover the diaphragm with some plastic substance. In certain experimental laboratories ordinary vaseline is used, but this is not suitable in this instance, as in hot weather the vaseline is apt to run. As an alternative to this, I have employed Chatterton's compound, which, I believe, is a mixture of rubber and bitumen, to cover the diaphragm. The amount that should be employed is most critical; if too thick, the action of the diaphragm will be greatly impeded, while if too thin the action will, of course, be insufficient to prevent the occurrence of resonance.

When the damping has been nicely adjusted, one should be able to hear faint, but very clear, reproduction of any sound produced many feet from the microphone. When this is amplified, the same clarity should be obtained, but instead of the faint sound it should be very great in volume. Usually two stages of low-frequency amplification are sufficient to produce the required volume, but less than two stages is not recommended.

There is only one more remark to make with regard to the microphone, and this is that the acoustics of the room should be suited to it. In a room that is very bare of draperies, the echoes about the room have an unpleasant effect when sound is amplified to a considerable extent, even when the listener is deaf. The remedy is to hang more draperies, such as heavy curtains, about the room and spread a thick carpet. This soon reduces the echo. It is for this reason that broadcast studios are so heavily draped. In the early days of broadcasting it is possible that the effect was rather overdone, but it shows the necessity for such a step where the acoustics of a room are not good.

With regard to the multi-point switch, something is required that can be conveniently fixed to the wall. I therefore outline the details of such a switch, which can be mounted on a piece of ebonite, as shown in fig. 6.

The rest of the apparatus required can be seen by referring to fig. 2, in which are shown the circuit connections. This comprises a transformer and a battery (a 1½-V dry cell). The resistance of the primary of the transformer should be between 120 ohms and 200 ohms, and that of the secondary between 1,000 and 5,000 ohms. This type of transformer is sometimes spoken of as a modulation transformer.

Although most of the apparatus described may be obtained from any suitable dealer, I have made arrangements with the Thames Electric Co., Kingston-on-Thames, to supply any of the required parts, including a clock case as shown in fig. 2. I have also arranged for a demonstration model to be fixed up at that address. It will be shown to anyone who is interested or would like to try it.

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### Electric Mine Locomotives.

The Baldwin-Westinghouse mine locomotives exhibited at the American Mining Congress represented modern trends in the development of haulage and gathering types. The four-ton gathering locomotive was claimed to be the lowest and slowest of its type ever built, and meets the demand for motive power for working thin seams, having an overall height of 23¼ in. and speeds of 2¼ miles an hour when operating from conductor cable and 6 miles an hour when operating from the trolley. Its features include semi-magnetic control, bar-steel frames, self-equalising coil springs, spacious accommodation for the driver, ball-bearing motors, vertical type cable reel, and a new type of resistor. One of these locomotives with drum-type control is now used by the Erskine Coal Company, of Staunton, Virginia.

# The Royal Society's Soirée.

## Annual Exhibition and Demonstrations.

THE first of the Royal Society's two annual conversaziones was held at Burlington House, London, on May 11th. Sir Ernest Rutherford, O.M., president, welcomed Fellows and guests for whose inspection the customary display of scientific apparatus, specimens, and demonstrations had been arranged. The total number of exhibitors was 30; several showed two or three items, but electrical exhibits were not so numerous as in previous years, and some of them had previously been exhibited elsewhere.

The National Physical Laboratory's several exhibits included specimens of metals of high purity, the impurities in which were only detectable spectrographically, prepared in its Metallurgy Department: amongst them were iron prepared electrolytically from a chloride electrolyte, melted in a high-frequency induction furnace, and deoxidised by means of pure dried hydrogen; manganese made by vacuum distillation in a high-frequency furnace; chromium obtained by electro-deposition and subsequently freed from hydrogen and deoxidised; and beryllium of 99.8 per cent. purity prepared by fusion-electrolysis.

For gas analysis by utilising high-frequency vibrations (Dr. Ezer Griffiths, F.R.S., and Mr. J. H. Awbery), a quartz crystal, maintained in vibration piezo-electrically, was used to set up a stationary wave system in the gas mixture; the positions of the nodes were identified by the reaction on the crystal in the manner described by Pierce; by moving the reflector from node to node, the wave-length was determined, affording a measure of the composition of the gas mixture.

The Cambridge Instrument Co., Ltd., had a portable magnetometer of the null type on view, which was designed by Dr. F. E. Smith, F.R.S., for measuring the horizontal component of the earth's magnetic force. The magnet system is supported by floats and is practically free from friction effects. The earth's horizontal magnetic force is nearly balanced by an opposing force due to a current in the coils, the two forces being inclined at an angle of a few degrees; the magnet sets in the direction of the resultant force, and the angle is varied until the resultant field is at right angles to the force due to the coils. The angle is observed by means of a telescope, and measurements may be made with an error not exceeding 1 gamma (0.00001 c.g.s. unit).

A beautifully made improved form of Paschen galvanometer was shown, the moving system of which consists of two groups of cobalt steel magnets so made as to ensure uniformity of physical condition and size, thus ensuring almost perfect astaticism. The system is protected from external magnetic fields by a shield of "mumetal" as suggested by Prof. A. V. Hill, F.R.S., and Mr. A. C. Downing, surrounded by a mild-steel tube and by an outer gun-metal shield. A model (ten times full size) illustrated the method of mounting the magnets and mirror, and a group of magnets shown under the microscope demonstrated the accuracy of dimensions which can be obtained.

The Company's apparatus for recording radiation from the sky makes use of a photoelectric cell so connected in an electrical circuit containing capacity that the frequency of discharge depends on the intensity of the radiation falling upon the cell. The total discharge is recorded on a standard thread recorder without the use of an auxiliary relay, the curve obtained being a record of the intensity of radiation.

Prof. O. W. Richardson, F.R.S., and Mr. F. S. Robertson demonstrated apparatus for comparing the yield of soft X-rays from different substances. They employed a small X-ray tube of transparent silica with an incandescent cathode; its target was a vertical hexagonal prism, whose faces consisted of six plates of the substances to be tested, which could be turned about its central axis and put into any one of six set positions by means of an external magnet. Thus each substance could be used in turn as target and the rays generated compared by the photoelectric effect they produced in another part of the tube. With this apparatus the exhibitors have been able to show that the generation of soft X-rays is a periodic function of the atomic number of the elements concerned.

The International Standard Electric Corporation showed apparatus for precision measurements of circuit efficiencies as used on the Anglo-American transatlantic telephone service, that is, transmission levels and losses and repeater gains at telephone frequencies of from 35 to 5,000 cycles. The oscillator used with the equipment had a frequency range from 35 to 50,000 cycles, the higher range being used for carrier-current telephony. The working of the instruments was demonstrated by making measurements on artificial cable.

Mr. H. Dewhurst demonstrated how the rapidity of response to radiant heat of bolometers has been much enhanced by an entirely new method of constructing them. By means of a press flat annular disks of wax containing two inlaid metal contact pieces are stamped out, and thin collodion films are stretched across the disks by floating the latter on mercury. A narrow strip of bismuth ($10^{-6}$ cm. thick) is next deposited on each disk by electrical evaporation, or "sputtering," across the film from contact to contact, the whole being then blackened.

The British Thomson-Houston Co., Ltd., showed a new type of electric discharge, the phenomena having been discovered by Dr. I. Langmuir (see Elec. Rev., November 21st, 1924). An arc was produced in a hot cathode discharge tube 3 cm. in diameter and 50 cm. long, containing argon. Before the injection of a dose of tungsten vapour the arc did not possess unusual characteristics, but after the liberation of tungsten vapour from the filamentary cathode, the arc exhibited phenomena of interest and beauty.

Lt.-Commander F. J. Campbell Allen and Mr. A. E. Salisbury exhibited a new thermostat for use in conjunction with electric circuits, which depends upon the fact that magnetic metals lose their magnetism at certain given temperatures, and alloys of these metals can be made to vary the temperature apart from doing so by means of radiators. In the "on" position an armature was held up by attraction to a controlling arm in a suitable position to be affected by heat, the arm being partly or wholly made of magnetisable material; on a given temperature being reached, the armature was released and fell on a switch, thereby cutting off the current, and the temperature of the apparatus was reduced, when the armature was again lifted and the current switched on.

*(To be concluded.)*

# Modern Stage Lighting.

**A brief review of the apparatus developed by the General Electric Co., Ltd., for the production of effects on the stage, with particular reference to the Schwabe-Hasait system.**

THE development of electrical methods of lighting has placed at the disposal of stage managers the means of vivid and accurate mimicry of nature. A recent demonstration by the General Electric Co., Ltd., at its new stage-lighting showrooms (ELEC. REV., November 5th, 1926, p. 758) of some examples from the wide range of stage-lighting equipment produced by it, gave some indication of the progress that has been made in this direction. The apparatus includes that specially designed for the Schwabe-Hasait system, first described in our issue of March 16th, 1923, the sole rights of which have been acquired by the G.E.C. for the United Kingdom and the Colonies.

Fig. 1.—Magazine Stage-lighting Batten.

There are two principal considerations in general modern stage lighting, the illumination of the acting area and also of the "artificial horizon." While still retaining the use of footlights and battens where required, the latest methods of lighting the acting area rely to a great extent upon the use of specially designed floodlights, projectors and spot-lights. Fig. 1 shows a magazine-type batten. It consists of a series of compartments, each fitted with a lampholder and reflector.

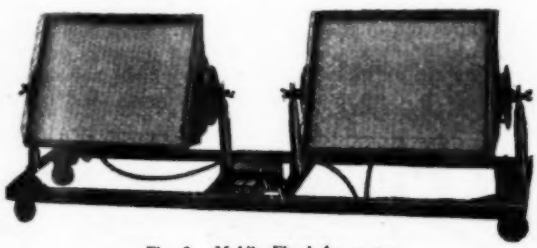


Fig. 3.—Mobile Flood Apparatus.

The reflectors may be of highly polished aluminium, silvered glass, or stainless steel. The lamps are spaced at from 6- to 7½-in. centres, and are of sizes up to 150 W.

A very wide range of flood-lighting apparatus is produced, only a few examples of which can be dealt with here. Fig. 2 shows the "Horizon" flood, which is primarily intended for the illumination of the cyclorama or "artificial sky." The special feature in the design lies in the shape of the colour filter; this is semi-cylindrical in shape, and allows a spread of light covering about 180 deg. Each fitting is designed to take one 1,000-W tubular theatre horizon-type lamp, and is equipped with an aluminium reflector. A particularly useful piece of apparatus is the mobile ground flood, fig. 3. It consists of two 1,000-W floods carried on a light metal trolley which can be easily moved to any required position with a minimum amount of trouble. The floods are mounted on uprights, and are hinged so that each one may be tilted at any desired angle. Glass colour slides in metal frames are supplied in varying colours. A proscenium floodlight apparatus is shown in fig. 4. It is of the magazine type, and is specially adaptable for use on the small stage as a substitute for battens, and in the case of large stages it may be used as an auxiliary to the battens. The special feature is a magazine equipped with a set of four glass colour slides. These are operated by steel tracker wires running over pulleys to a four-lever control gear in a convenient position.

Fig. 2.—Horizon Flood.

A large variety of apparatus for spot lighting made by the company includes a small 100-W hand spotlight lamp and a large bracketed apparatus designed to take a 1,500-W horizontal burning projector type lamp. The latter is fitted with a universal joint enabling the light to be thrown at almost any angle in any direction. Fig. 5 shows a proscenium spotlight apparatus suitable for a 1,000-W lamp. For the correct illumination of the artificial horizon, very strong light, variable at will both in colour and intensity, is required, and the ideal source is the gasfilled lamp. A number of special fittings of the type shown in fig. 2 are used, depending upon the size of the "horizon" or the dimensions of the stage itself. They are built up in three or four tiers, forming a homogeneous unit, and are supported in a rigid metal frame

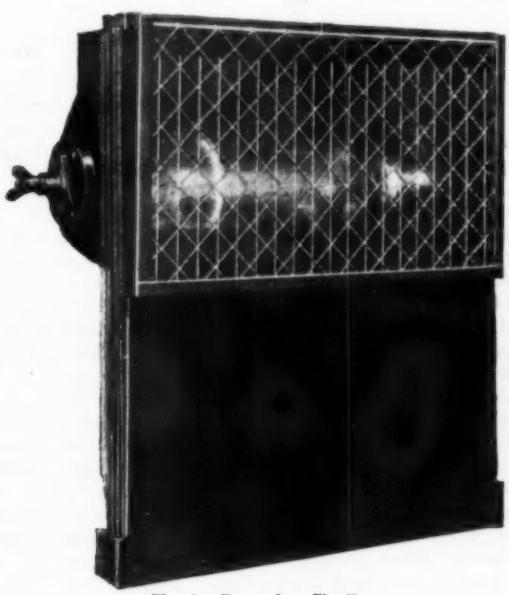


Fig. 4.—Proscenium Floodlamp.

suspended from the roof. The representation of natural effects—such as dawn, sunrise, and so on—is possible, with innumerable shades and intermediate gradations, by the use of the "artificial horizon," and the scientific combinations of colour necessary for these charming sky-pictures have been studied exhaustively and worked out to a nicety. By suitable combinations of the basic colours it will be seen that a very wide series of tones is available by which any natural sky phenomena may be produced.

Complete and flexible control of the lighting of the "artificial horizon" is obtained by a master control apparatus which operates a series of resistances in circuit with the individual lamps. This is designed in such a way that dimming or raising the light takes place smoothly and easily. As the source of light is at a high level, the lower part of the horizon does not receive from it the same intensity of illumination as the upper portion. To remedy this a number of horizon lamps are placed at the level of the stage. These are contained in movable trolleys, spaced round the bottom of the screen, and are supplied with colour slides and

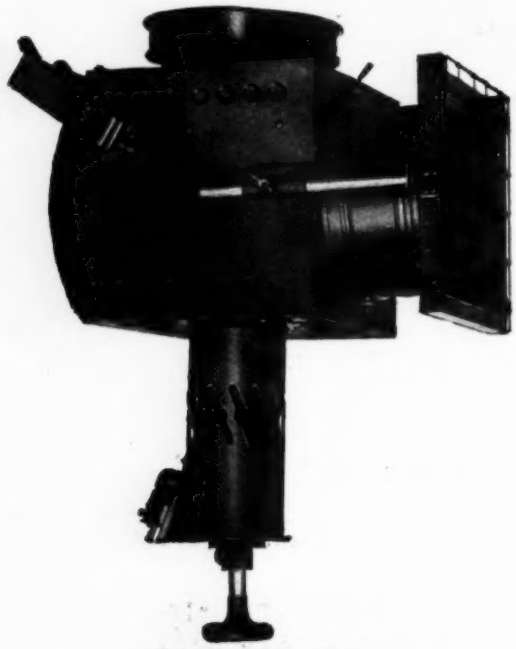


Fig. 5.—Proscenium Spotlamp.

arranged so that they can be tilted at any angle. Ample provision is made for the adequate ventilation of the lamps, each of which is protected by wire guards from accidental breakage.

A far wider range of sky effects than is possible with any of the other apparatus is obtainable by means of the cloud apparatus, used in conjunction with the "artificial horizon," which offers an ideal setting for the reproduction of moving clouds. Fig. 6 shows a unit of this description. It consists of two essential portions: one which is stationary carries the main driving motor, the collector rings, and a 3,000-W gasfilled lamp; the other, which rotates round the first, carries a system of cloud-pictures, lenses and reflectors, and two small motors for driving two lines of shafting through special gearing. The shafts give motion to a series of eccentrics which cause a number of reflectors to rotate through a definite angle, thus causing the cloud-images to rise or fall as desired. The moving system has its cloud slides arranged in two tiers. Immediately behind each slide a condenser transmits the rays from the lamp through the slide on to a fixed glass reflector; this in turn transmits the picture through an objective lens on to a movable glass reflector actuated by one of the eccentrics, the reflector throwing the picture on the horizon screen.

The slow motion of clouds across the sky is simulated by the rotation of the two tiers, which are driven by the main motor through reducing gears; the motor is reversible, so that the clouds can move from right to left, or *vice versa*, and by combining the horizontal with the vertical movements, diagonally travelling and thickening clouds may be produced. One particularly interesting effect obtainable by the combination of these movements is that of two separate banks of cloud travelling independently one above the other, a phenomenon frequently observed in nature. The success of the cloud apparatus is greatly influenced by the manipulation of the horizon lighting, which creates the illusion of the sky itself.

Fig. 6.—Cloud Apparatus.

The effect of the cloud apparatus may be intensified by the addition of the panorama projection apparatus, fig. 7, which projects a series of cloud pictures or landscapes on the artificial horizon. It consists essentially of three projectors mounted on a tubular steel frame,

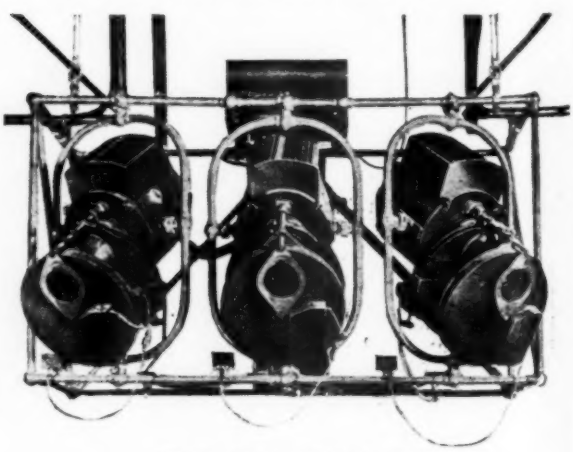


Fig. 7.—Panorama Projection Set.

capable of being tilted in an upward or downward direction, and with each lamp mounted in such a manner that it can swing on its horizontal axis and be locked in the desired position by a set-screw. The raising and lowering movement is obtained by a small motor driving a screwed spindle, the rotation of which operates wires attached to the projectors. Each pro-

jector, in addition to its 3,000-W lamp, adjustable by means of a handwheel operated from the exterior, is equipped with an adjustable reflector which enables the focus of the beam of light to be readily corrected. Two disks are fitted to each lamp, one being a colour-screen, the other containing several dia-positives, so that it is possible, to take one illustration, to obtain three entirely different panoramas without the necessity of changing slides. In front of the projector lens a circular motor-driven colour-screen is fitted by which the operator can control various special colour effects.

In addition to the foregoing, many pieces of apparatus are produced which would not come under the heading of general stage-lighting apparatus, being specially designed to meet particular requirements and conditions. For instance, lightning is produced by an electrical discharge. Special arc lamps with impregnated flame-carbons are used; as soon as the current is switched on an arc is struck, only to be broken immediately by the rapid raising of the upper carbon by means of a coil; the sudden flash is projected through a shutter having a suitable aperture, thus giving a vivid momentary glare. The carbon is retained in its raised position until the switch is opened.

# Business and Industrial Notes.

**The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations and Failures.**

### South America the Battleground: A Berlin Report.

In view of recent statements regarding hopes of foreign electrical interests concerning an organised attempt to dominate the electrical market here and elsewhere to our own exclusion, the following report received from the British United Press in Berlin, under date May 11th and published in the *Financial Times*, will probably be found both interesting and amusing. The "remarkable statement," as it is described, is attributed to the *Deutsche Bergwerks Zeitung*, the organ of the Ruhr industrialists:—"The British electrical industry suspects the existence of a secret agreement between French and German electrical producers for the domination of the European market. Because of this, Britain has launched a policy of reprisal in South America."

### International Trust Rumours.

According to various reports circulated in some Continental newspapers, discussions have just taken place at Uschy between representatives of the electrical industries of the leading countries. It is, however, stated to be incorrect that these conversations are connected with proposed arrangements concerning the division of the production and sales. In this respect a Cologne newspaper states that the matter solely concerns the negotiations taking place before the world economic conference at Geneva in so far as applies to the countries participating in the conference; and, moreover, the discussions have only been of a general nature.

### Results from Propaganda.

The desire of our kith and kin in New Zealand to deal with electrical manufacturers and traders in this country rather than make their purchases from American or other foreign sources is very marked, but it is essential that British concerns should keep themselves and their product well in evidence there. We have lately had brought to our notice an experience which shows the reward that suitable publicity, even of a most general kind, may bring. A New Zealand paper reported a statement on the all-electric house, made at a meeting of the Walsall Rotary Club by Mr. H. G. Truman, of the Truman Electrical Co., electrical contractors, of Walsall. This attracted the attention of the secretary of the Wellington Golf Club, who deduced from it that the Truman Company manufactured electric ranges, and wrote: "We are considering installing a cooking range at this club. There is no English range on the market here, but any number of American ones. We should naturally prefer to buy one from England if possible." A quotation was asked for. We quote this as an example of the way in which electrical propaganda works round and brings business in quite unthought-of ways.

### Wages in the Engineering Industry.

Referring to the engineering trade unions' request for an advance of wages, which is under consideration by the employers, the May *Journal* of the Amalgamated Engineering Union deals with the future of the industry. It is suggested that a joint committee should be formed to examine trade conditions at least half-yearly with a view to making recommendations regarding wages; it is considered that a minimum should be fixed below which wages could not fall.

### United States Radio Patent Litigation.

The *Telegraph and Telephone Age* reports that the "big three" of the American radio industry, the Radio Corporation of America, the American Telephone and Telegraph Co., and the General Electric Co., have commenced a legal campaign against infringers of their patents, which, it is said, may "tie up" most, if not all, of the sets in use in the United States and elsewhere. The campaign follows a recent decision of the Canadian Courts in favour of the Canadian General Electric Co., Ltd., against the Fada Radio Co., Ltd., in relation to the alleged infringement of a radio-frequency tuning patent. The General Electric Co. is taking action upon an alleged infringement of the United States patent on the same subject granted to Dr. E. F. W. Alexander and others. This is said to affect every type of receiving set employing tuned radio-frequency amplification. The General Electric Co. owns the Alexanderson patent, but the Radio Corporation of America controls the licence in the United States. The Radio Corporation has already taken action against the Atwater Kent Radio Manufacturing Co., of Philadelphia, for alleged infringement of the Alexanderson patent.

### A B.T.-H. Lighting Scheme.

In the reconstruction of their general offices and the provision of a staff restaurant, Messrs. John Player & Sons, Nottingham, have adopted B.T.-H. lighting fittings according to a scheme prepared by their engineer, Mr. Wardle, and the British Thomson-Houston Co., Ltd. The new offices and restaurant occupy two floors each 240 ft. long by 38 ft. wide. On the lower floor, which is now one large general office, the installation comprises 40 "Trojan" totally-enclosed fittings (ceiling type), fitted with 200-W "Mazda" gasfilled lamps. The top floor is partly divided into a number of small offices, necessitating a larger number of fittings. On this floor there are 61 ceiling-type "Trojan" fittings each equipped with a 150-W gasfilled lamp. The installation provides a uniform illumination of about 6 ft.-candles.

### The Irish Radio Import Duty.

A motion for the repeal of the duty upon imported radio apparatus was defeated in Dail Eireann on May 11th. The Minister of Posts and Telegraphs said that the duty was essential to cover the difference between the expenditure upon broadcasting and the receipts from licence fees. He mentioned that it was proposed to erect a high-power station at Athlone, and also stated that the number of licence holders was expected to be 100,000 in four years' time.

### German Lamp Production.

The *E.T.Z.*, Berlin, has recently published some figures showing the production of electric lamps in Germany in 1925. The output of metal filament and Nernst lamps is returned at 78 millions, as compared with 71¼ millions in 1924. Of this total 29 million lamps were exported as against 29.8 million in the preceding twelve months. The production of mercury vapour lamps declined from 4,200 to 1,900. On the other hand the output of arc-lamp carbons increased from 715.8 tons to 777.4 tons.

### Indian Tariff Revision.

The *Board of Trade Journal* of May 12th contained the first part of a reprint of the revised Indian tariffs. Among the classes of goods dealt with is electrical control and transmission gear, comprising switches, fuses, and current-breaking devices of all descriptions, designed for use in circuits of less than 10 A at a pressure not exceeding 250 V, and regulators for use with motors designed to consume less than 187 W; bare or insulated copper wires and cables, any one core of which has a sectional area of less than one-eightieth of a square inch, and wires and cables of other metals of not more than equivalent conductivity; and line insulators, including cleats, connectors, leading-in tubes and the like, of types and sizes such as are ordinarily used in connection with the transmission of power for other than industrial purposes, and the fittings thereof. All the above are subject to an import duty of 15 per cent. *ad valorem*.

### Modern Floodlighting.

We illustrate two widely-different examples of the employment of floodlighting which have recently come to our notice. The first illustration is the exterior of the People's Palace, Mile End Road, which was illuminated by means of ten

**The People's Palace, E.**

B.T.-H. 500-W projectors. It was in this building that the Stepney Electricity Department recently ran a successful exhibition.

The other example comes from the "Underground" group. The picture shows the results obtained in the floodlighting of the corridors at Finsbury Park station leading to the Piccadilly Tube. Inner walls have been built, and

**Corridor Lighting at Finsbury Park Station.**

from behind cornices concealed projectors throw their rays upwards on to the white roof. In this way diffused adequate illumination is obtained. Floodlighting has also been used upon the station front.

### Electrical Power in Industry.

Preliminary Report No. 11 upon the 1924 Census of Production (published with the *Board of Trade Journal* dated May 12th), deals with further branches of industry. The section relating to the silk and artificial silk trades shows that the capacity of electrical generating plant in use rose from 1,660 kW in 1907 to 16,910 kW in 1924. This supplied power for 14,391 h.p. of electric motors, while in addition power was purchased for 17,732 h.p. The elastic webbing trade reported 258 kW of generating plant and 1,993 h.p. of electric motors (power for 1,758 h.p. purchased). In the pen, pencil, and artists' materials trades there was 314 kW of generating plant and 3,126 h.p. of motors (power for 2,859 h.p. purchased). The generating plant employed by the ink, gum and sealing wax trades aggregated 314 kW, and there was 4,584 h.p. of electric motors (power purchased for 4,425 h.p.).

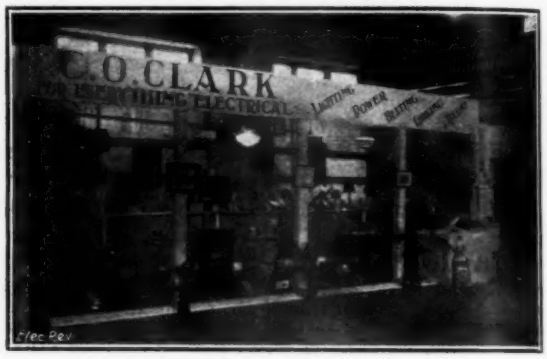
### Our Electrical Machinery Exports.

We give below the distribution of the electrical machinery exports shown in our monthly table on p. 813. The figures are compared with those of April, 1926:—

| Destination. | April, 1926. £ | April, 1927. £ | Inc. or dec. £ |
|---|---|---|---|
| European countries ... ... | 81,783 | 89,655 | + 7,872 |
| Japan ... ... ... ... | 23,021 | 3,889 | − 19,132 |
| South American countries ... | 22,652 | 35,505 | +12,853 |
| South Africa ... ... ... | 48,806 | 69,431 | +20,625 |
| British India ... ... ... | 99,488 | 94,818 | − 4,670 |
| Australia ... ... ... ... | 62,426 | 109,267 | +46,841 |
| New Zealand ... ... ... | 10,704 | 14,569 | + 3,865 |
| Canada ... ... ... ... | 16,765 | 9,887 | − 6,878 |
| Other countries ... ... ... | 47,217 | 43,960 | − 3,257 |
| Totals ... | £412,862 | £470,981 | +£58,119 |

### A Kent Electrical Retailer's Enterprise.

An example of aggressive electrical propaganda by an electrical retailer has been brought to our notice. Mr. C. O. Clark, of Deal and Dover, recently organised exhibitions in these two towns and attracted a great deal of attention and business. The first show was held at Dover on May 3rd and 4th, and was opened by Sir Edwin Farley, president of




**Domestic Section of the Exhibition.**

the Dover branch of the Wireless League. In addition to a wide range of radio apparatus, there were examples of the latest lighting, heating and cooking apparatus of leading makes. The whole exhibition was moved to the Winter Gardens, Deal, on May 5th, and was opened by the Mayor

**Radio Display at the Exhibition.**

of Deal, who considered that he was not exceeding his duty in supporting the enterprise of one of the citizens; the exhibition, he said, would not merely secure business for Mr. Clark, but would show what electricity could do. The exhibition remained open until the following day, and during its run lectures and demonstrations were given. Two of the stands are shown in the illustrations herewith. The attendance at the two shows was over 3,500.

### Unemployment.

The total number of registered unemployed declined further during the week ended May 2nd. At that date the number was 1,021,700, as compared with 1,044,750 on April 25th, and 1,105,916 on May 3rd, 1926.

### New Italian Companies.

Among the companies recently formed in connection with the electrical engineering industry in Italy are the Società Fabbrica Articoli Isolanti, F.A.I., Pianezza, capital 240,000 lire; La Società Italiana Construcioni Elettromeccaniche, Turin, capital 700,000 lire; and La Società per la Fabbricazione di Isolanti Elettrici, Milan, capital 50,000 lire.

### Social Events.

The G.E.C. Social and Athletic Club cricket season is now in full swing. An auspicious start was made on April 30th, when three elevens were fielded. The batting augured well for a successful season. Most of last season's players are available, with much promising new talent. Twelve tennis courts are available, and a "Beginners' Evening" once weekly provides a welcome "nursery" where advice and instruction is given to novices. A Swimming Club has also been formed and is attached to the Holborn Municipal Baths. The football season just ended was one of the most successful in the history of the club. The first and second elevens won the championships of their sections of Divisions I and II of the London West End Amateur Football Association.

In its first season in the "Beatty" League of the Sheffield and District Works Sports Association, the football club of the Metropolitan-Vickers Electrical Co., Ltd., was successful

The Metro-Vick Football Team.

in winning the championship. The team won 13 out of 19 matches, and only lost two. Our illustration shows the team with the handsome shield presented to the Association by Admiral Earl Beatty.

The Macintosh Cable Co.'s team, in First Division Association football, has won the Derby Amateur Cup.

### Registered Contractors.

The following applications were accepted by the Executive Committee of the National Register of Electrical Installation Contractors on May 13th:—

Lambert & Vallack, South Shields.
Wilkins Electrical Works, Ltd., W.12.
Brice, W. V., W.C.1.
Taylor, F. W., & Son, Milnsbridge, near Huddersfield.
Bacchus, H., Ltd., Bedford.
Headen & Brennand, Halifax.
Holt, W. P., & Co., Bradford.
Thomson, D., & Sons, Carlisle.
France's, Darlaston.
Penty & Margetts, Bradford.

At the same meeting four applications were declined.

### The Timber Trade.

Our Timber Trade correspondent writes:—"Whilst there is a better consumption of building woods, including poles, than at this time last year, stocks are not so large. Fresh supplies, however, are likely to be heavier than those of the corresponding period of 1926 now that navigation has been reopened, for there has been large forward buying. Prices keep very firm for the better qualities, whilst values for inferior grades are steady. The Mississippi disaster has had the effect of steadying the market on this side for the American hardwood varieties, and values are firmer, although not on such a large scale as might be anticipated by the more optimistic operators. Stocks, however, are ample, and should spot prices show any great increase, consumption is sure to be affected. The better market for the American woods also has an influence on values of other descriptions. The hard and fancy woods, including the better grades of mahogany, teak, ebony, and rosewood, are strong in value, but the demand for these is not active."

### New French Companies.

A company has lately been formed in Paris (1, Rue de Metz) with a capital of 500,000 fr. and the title La Société de la Lampe Microlux, to manufacture electric lamps.

La Société d'Amenagements Hydro-Electriques is the name of a new company which has been formed in Paris (10, Rue Rossini) with a capital of 500,000 fr., to develop hydro-electric undertakings.

### New Municipal Showrooms and Offices.

The East Ham Corporation has appointed a committee to select a site for the erection of electricity showrooms.

The Scarborough Corporation has adopted a recommendation of the Electricity Committee to purchase 89, Westborough, at a cost of £6,875 as showrooms for the electricity undertaking.

### Trade Announcements.

MR. BERL WOBER, late manager in Scotland for the Lunar Electrical Co., Ltd., has been appointed managing director of the Bryterlite Electrical Co., Ltd., at 10, West Campbell Street, Glasgow, from which address a wholesale electric lamp and accessory business will be carried on.

The address of MESSRS. ROBERT BLACKWELL & CO., LTD., is now Mitcham Road, Croydon. Telephone: Thornton Heath 2410-11-12; telegrams: "Kurkee, Croydon."

MESSRS. J. V. BRITTAIN & CO., LTD., have removed to larger premises at Kingsway, Stoke-on-Trent, with a trade counter in Back Glebe Street. The company has a varied stock of wiring and colliery supplies, and runs a wholesale radio department.

MR. F. SANDLER, wholesale electrical and wireless factor, has removed to larger premises at 2, Mayes Street, Shudehill, Manchester.

Mr. LEONARD J. IVE, electrical and wireless engineer, of 7, Clarendon Corner, Watford, has opened new showroom premises at 11, The Parade.

A new company registered recently under the designation of FIAT BRITISH AUXILIARIES, LTD., with its head office at 133, Helen Street, Govan, Glasgow, is to start at an early date the manufacture of marine Diesel engines of the Italian Fiat type. The initial capital is £125,000. The subscribers are Messrs. James Caird, shipowners, London; Mr. J. Howden Hume, engineer, Glasgow; and Mr. E. W. Harvey, engineer, London. Operations will be started as soon as the necessary plant and equipment are installed.

An arrangement has been entered into between Messrs. CARLO BRIVIO, of Milan, and AUTOMATIC & ELECTRIC FURNACES, LTD., for the manufacture and sale of "Wild-Barfield" electro-magnetic furnaces in Italy.

The address of the BOSTON & DISTRICT ELECTRIC SUPPLY CO., LTD., for all correspondence is Mount Bridge Power Station, Boston, Lincs. Manufacturers and others who have been in the habit of sending correspondence to the Dolphin Lane showrooms are asked to note that no office business is transacted there.

### New Catalogues and Lists.

MARCONI'S WIRELESS TELEGRAPH CO., LTD., Marconi House, Strand, London, W.C.2.—A series of illustrated descriptive pamphlets: Leaflet No. 1,069, type 201, 1.5-kW telegraph-telephone transmitter for submarines, gunboats, and other small craft. Leaflet No. 1,068, type 20Y, Marconi-Newton constant-speed propeller for wind-driven aircraft generators. Sheet A12/2, 30-watt transmitting valve. Sheet A19/2, 40-watt dull-emitter transmitting valve. Sheet A20, 1-kW modulating valve. Sheet A21, 1-kW transmitting valve with shield outside bulb for short-wave work. Sheet A22, 400-watt transmitting valve with shield outside bulb for short-wave work. Sheet C20, two-electrode 15 mA dull-emitter half-wave rectifying valve. Sheet C21, double-electrode full-wave 50 mA rectifying valve. Sheet D1, cooled-anode 10-kW transmitting valve. Sheet D2, cooled-anode 12.5-kW transmitting valve. Sheet D3, cooled-anode 5-kW modulating valve. Sheet D4, cooled-anode 5-kW absorber valve. Sheet E1, cooled-anode low-impedance transmitting valve.

The BRITISH ALUMINIUM CO., LTD., Adelaide House, E.C.4.—An illustrated pamphlet dealing with aluminium for special advertising van bodies.

MESSRS. ROBERT MCGREGOR & CO., Alpine Steelworks, East Molesey, Surrey.—List No. 124, giving illustrations, sizes, and prices of mild-steel cable hangers and racks.

The BEKO LAMP CO., LTD., 5, Finsbury Square, E.C.2.—A pamphlet describing the "Beko" 10-gal. electric boiler. Illustrated and priced.

The METROPOLITAN ELECTRIC CABLE & CONSTRUCTION CO., LTD., Fuller Works, Chadwell Heath, Essex.—Price List No. 20, containing prices of v.i.r. taped, braided, and compounded cables and lead-covered cables.

AUTOMATIC & ELECTRIC FURNACES, LTD., 173-175, Farringdon Road, E.C.1.—A priced and illustrated pamphlet describing the "Wild-Barfield" electric solder bolt heater.

The STANDARD RESISTANCE CO., Broomfield, Chelmsford.—List No. 6, containing illustrations, particulars, and dimensions of wire resistance grids.

MESSRS. COURTNEY, RUSSELL & CO., 65a, Holborn Viaduct, E.C.1.—A leaflet illustrating five examples of crystal electric lighting fittings.

The EDISON SWAN ELECTRIC CO., LTD., 123-5, Queen Victoria Street, E.C.4.—This company has sent us a complete set of its catalogue sections in a neat binder. The sections are well illustrated and priced and cover lamps, lighting fittings, fans, heating and cooking apparatus, instruments and meters, batteries, accessories, d.c. and a.c. motors, and radio apparatus.

GRAHAM AMPLION, LTD., 25-26, Savile Row, W.1.—A black and white wall sheet advertising the "Amplion" cone loud speaker and illustrated and priced folders dealing with loud speakers, gramophone attachments, &c.

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The SAXONIA ELECTRICAL WIRE CO., LTD., Roan Works, Greenwich, S.E.10.—A net trade price list of magnet wires, flexibles, v.i.r. cables, &c.

MESSRS. ISENTHAL & CO., LTD., Ducon Works, Victoria Road, North Acton, W.3.—A preliminary list dealing with the "N.C." automatic rapid action voltage regulator which the company is commencing to manufacture.

MESSRS. MAVOR & COULSON, LTD., 47, Broad Street, Mile End, Glasgow.—Pamphlet No. 21/1, dealing with knife switches for pressures up to 660 V, and Pamphlet No. 31/1, describing medium-pressure, heavy-duty fusible cut-outs. Illustrated and priced.

MESSRS. S. G. BROWN, LTD., North Acton, W.3.—The "Brown Budget" for May containing articles and notes on "Brown" loud speakers in various parts of the world.

The JACKSON ELECTRIC STOVE CO., LTD., 143, Sloane Street, S.W.1.—May calendar-blotter advertising the "No. 154" electric wash-boiler.

MESSRS. H. CLARKE & CO. (MANCHESTER), LTD., Atlas Works, Old Trafford, Manchester.—A catalogue dealing with the company's "Neutrofour" radio receiver, containing details, illustrations and prices of the necessary components and accessories.

BERRY'S ELECTRIC, LTD., 85 and 86, Newman Street, Oxford Street, W.1.—Two pamphlets giving particulars and prices of the "Wilton" fire and the "Fleur-de-lis" basket and dogs. The illustrations show these to be handsome additions to the "Magicoal" series.

The HART ACCUMULATOR CO., LTD., Marshgate Lane, Stratford, E.15.—A coloured showcard advertising "Hart" automobile lighting and starting batteries.

MESSRS. CHARLESWORTH PEEBLES & CO., 5, Eden Street, Hampstead Road, N.W.1.—Pamphlets advertising the "Protos" vacuum cleaner.

MR. ALAN WRIGHT, 124, Chancery Lane, W.C.2.—A booklet containing illustrations, particulars and prices of "Inventum" electric water-heating appliances.

The WESTON ELECTRICAL INSTRUMENT CO., LTD., 15, Great Saffron Hill, E.C.1.—A priced and illustrated booklet dealing with the company's voltmeters, milliammeters, galvanometers, &c., for radio measurements.

### Bankruptcy Proceedings.

FRANCIS HUSBAND, "The Hollies," Sandpit Lane, St. Albans, engineer.—The first meeting of creditors was held recently at 29, Russell Square, W.C.1. The statement of affairs showed liabilities expected to rank at £4,074, against gross assets of £35, which amount was absorbed by preferential claims. Debtor attributed his failure to liability under guarantees on behalf of a limited company, judgments obtained against him under a building contract entered into with his wife, and expenses of his wife's illness, bad debts, and unemployment. In 1915 debtor and another formed a limited company as F. Husband, Ltd., with £1,000 nominal capital, to carry on business as electrical engineers. He was allotted 700 £1 shares partly for cash and partly as consideration for services in introducing business, and was appointed managing director. The company went into voluntary liquidation in 1920, and as guarantor on behalf of the company he was liable for debts of £3,134. From February to September, 1924, he was engaged on a contract for the supply of switchboards. In July, 1926, judgment was obtained against him for the balance of the purchase price of a house which had since been taken over by the mortgagees. Debtor admitted having been aware of his position since February, 1920. The case was left in the hands of the Official Receiver as trustee of the estate. The following are creditors:—

| | £ | | £ |
|---|---|---|---|
| Allied National Corpn., Ltd. ... ... ... | 51 | General Wireless, Ltd. ... | 35 |
| Davis & Ball ... ... | 53 | North Metropolitan E.P.S. Co. ... ... | 21 |
| Ducat, Dr. A. ... ... | 75 | Record Elecl. Co., Ltd.... | 71 |
| Electrical Contracts and Maintenance Co. ... | 70 | Braby & Waller ... ... | 45 |
| General Electric Co., Ltd. | 91 | Universal Housing Co. ... | 317 |
| | | West, L. C. ... ... ... | 44 |

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J. ATKINS, trading as Atkins & Co., Tewkesbury, Northleach and Winchcombe, Gloucestershire, electrical engineer. The following are creditors herein:—

| | £ | | £ |
|---|---|---|---|
| Atkins, E. M. (Mrs.) ... | 153 | Electrical Components, Ltd. ... ... ... ... | 30 |
| Atkins, J. ... ... ... | 32 | General Electric Co., Ltd. | 46 |
| British Petroleum Co. Ltd. ... ... ... ... | 40 | Moss, A. E. ... ... ... | 125 |
| Callender's Cable & Construction Co., Ltd. ... | 40 | Siemens Bros. & Co., Ltd. | 44 |
| | | Whitworth Electric Lamp Co., Ltd. ... ... ... | 61 |

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H. NUTTER, electrical engineer, 246, Yorkshire Street, Rochdale.—First meeting, May 24th, at the Official Receiver's offices, Byrom Street, Manchester; public examination, June 17th, at the County Police Court, Rochdale.

J. L. R. JENSEN (Jensen & McNicol), wireless accessories factor, 149a, Seabank Road, Wallasey.—Trustee, Mr. E. D. Symond, Official Receiver, 11, Dale Street, Liverpool, released May 5th.

S. HOLMES, electrical engineer, 5, Gibson Street, Burmantofts, Leeds.—Trustee, Mr. H. C. Bowling, Official Receiver, 24, Lower Bond Street, Leeds, released May 5th.

G. YOULL and A. FRASER (Youil, Fraser & Co.), electric lamp and wireless factors, 6, Hunter Street, Liverpool.—Trustee, Mr. E. D. Symond, Official Receiver, 11, Dale Street, Liverpool, released May 9th.

B. UTTLEY, electrician, 212, Central Drive, Blackpool, late of Tower Street, Bacup.—Trustee, Mr. J. G. Gibson, Senior Official Receiver, Byrom Street, Manchester, released May 3rd.

H. TIDSWELL (H. Tidswell & Co.), electrical engineer, 11, Bazaar Street, Pendleton.—Trustee, Mr. J. G. Gibson, Senior Official Receiver, Byrom Street, Manchester, released May 3rd.

C. J. NICHOLS (C. J. Nichols & Co.), electrical engineer, 7, Park Street, Bridgend, Glam.—Last day for proofs for dividend, May 27th. Trustee, Mr. G. G. Poppleton, 26, Corporation Street, Birmingham.

C. HUBBARD, electrician, 13, Magdalen Street, Norwich.—Last day for proofs for dividend, May 28th. Trustee, Mr. C. B. L. Prior, Official Receiver, 9, Queen Street Chambers, Norwich.

G. MASON and G. E. TINSLEY (Mason & Tinsley), electrical engineers, 6, Alberta Terrace, Sherwood Rise, Nottingham; and late of 94, Upper Parliament Street, Nottingham.—First and final dividend of 1s. in the £, payable May 23rd, at the Official Receiver's offices, 4, Castle Place, Nottingham.

G. MASON (separate estate).—First and final dividend of 10s. in the £, payable May 23rd, at the Official Receiver's offices, 4, Castle Place, Nottingham.

A. L. WEEKES, electrical engineer, 13, Crescent Road, Luton.—First meeting held May 17th, at the Official Receiver's office, The Parade, Northampton; public examination, May 27th, at the Court House, Luton.

P. CHESHIRE (P. Cheshire & Co.), electrical engineer and contractor, Water Street Works, Middleton, Lancaster.—First meeting held May 19th, at the Official Receiver's offices, Byrom Street, Manchester; public examination, June 15th, at the Court House, Church Lane, Oldham.

H. BEBBINGTON, electrical engineer, 14, Cestrian Street, Bolton.—Last day for proofs for dividend, May 25th. Trustee, Mr. J. G. Gibson, Official Receiver, Byrom Street, Manchester.

E. F. WOODGATE, electrical engineer, 7, St. John's Terrace, and Brunswick Cottage, Weymouth.—Last day for proofs for dividend, May 24th. Trustee, Mr. T. Barton, Official Receiver, Catherine Street, Salisbury.

### Company Liquidations.

SOUTHERN COUNTIES ELECTRIC LIGHT & POWER SUPPLY, LTD., 121, Cheapside, E.C.—Under a compulsory winding-up order, made last March, on the petition of a creditor, the statutory first meetings of the creditors and shareholders were held on May 12th at Carey Street, W.C., before Mr. H. E. Burgess, senior Official Receiver. The company was incorporated in November, 1924, with a nominal capital of £11,000, subsequently increased to £21,000, and was promoted by Mr. Edmund Octavius Eaton for the purpose of acquiring, developing, and carrying on electric light and power undertakings in the southern and western counties in Great Britain and elsewhere. The immediate object, however, was to take over the benefit of certain contracts entered into by the Electricity Finance & Distribution Corporation, Ltd. (another of Mr. Eaton's companies) for the supply of electric power in certain areas. Agreements were entered into in December, 1923, with the Rural District Council of Sturminster Newton, Dorset, for the establishment by the company of an electrical generating station, and laying of mains for the supply of electricity in the district of Sturminster Newton. In October, 1924, the directors entered into an agreement for the purchase of electric light undertakings at Battle, Sussex, and in March, 1925, they entered into a further undertaking for the laying of cables and the extension of mains between Chagford and Moretonhampstead, Devon, also for the supply of electricity at the rate of 5d. per kWh for 20,000 kWh per annum and 4d. per kWh in excess of that amount. The company also had an interest in the exploitation of Reid's patent process for the generation of electricity at a cheaper rate than any known process other than by water-power. This process was stated to be for the conversion of a non-combustible gas, obtained from the burning of chalk and coke, into a combustible gas. In the event of that process being a success the company was to have a licence to use the process in all its areas. The company applied for Special Electricity Orders for all its areas, but failed to obtain them, and the work at Battle involved it in a heavy loss. The Sturminster Newton scheme was partially completed at a cost of £3,000, but owing to insufficient funds the company was unable to continue the proposed extensions, and in August, 1926, the company's installation was taken over for £2,000 in shares by the Dorset and Devon Electricity Supply, Ltd., whilst at Moretonhampstead no work was done by the company. In order to obtain the finance necessary to carry out its schemes the directors, on December 12th, 1924, resolved to create first mortgage debentures, carrying 7 per cent. interest per annum, for £25,000. A prospectus was issued on March 23rd, 1925, offering for subscription 20,000 8½ per cent. participating preference shares of £1 each at par, and £15,000 first mortgage 7 per cent. debentures of £10 each at £9 16s. 0d. The issue of the prospectus was carried out by the Electricity Finance and Distribution Corporation, Ltd., at a cost of £8 per £1,000, plus petty cash and out-of-pocket expenses, and was supervised by Mr. Eaton at a fee of £100, plus travelling expenses. Owing to the poor response by the public to the first issue,

the prospectus was reprinted, and further issues made in May, 1925; a new prospectus was issued in the following October; and further prospectuses were sent out in February and June, 1926. The statements contained in the various prospectuses as to the position of the company and its undertakings will be the subject of further investigation by the Official Receiver. In September, 1925, some of the debtors and shareholders brought actions against the company and its directors for the return of moneys subscribed on the ground of fraudulent misrepresentations contained in its prospectus. The total amount subscribed by the public was £32,326. The failure of the company is attributed by the directors to insufficient capital at any one time to carry out its undertakings; the failure to obtain Special Orders for the supply of electricity in its areas; and excessive cost of obtaining capital. No statement of affairs had been lodged at the date of the meetings, but it appeared that the assets were valued at £7,421, and the liabilities were estimated at £19,142, including the debenture debt of £16,700. In consequence there is no possibility of any surplus becoming available for the unsecured creditors or of any return being made to the shareholders. The liquidation was left in the hands of the Senior Official Receiver.

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NADIN & DELL ELECTRIC, LTD.—A meeting of members is called for June 13th, at 5, Bold Street, Warrington, to hear an account of the winding up from the Liquidator, Mr. L. A. Voisey.

ELECTRICAL & RADIO DISTRIBUTORS, LTD.—Winding up voluntarily. Liquidator, Mr. F. E. Anderson, 50, Bedford Row, W.C.1. Meeting of creditors, May 25th, at the liquidator's offices.

MAGNETIC SIGNS & CARRIERS, LTD.—A meeting of members is called for June 10th, at 18-19, Ironmonger Lane, to hear an account of the winding up from the liquidator, Mr. J. C. Sherrott.

### Private Arrangements.

S. S. JURY, trading as Jury's Electric Service, 128, Far Gosford Street, Coventry, electrical and wireless dealer.—In response to a circular letter issued by Mr. J. W. B. Allen, Barbican Chambers, Earl Street, Coventry, a meeting of creditors was held recently at Birmingham, when a statement of affairs was submitted which disclosed liabilities of £2,914 and net assets of £1,322, leaving a deficiency of £1,592. It was reported that the debtor commenced trading in 1923, and at the outset was successful. Subsequently he acquired other premises, and in consequence of heavier overhead expenses he traded with a very fine margin of profit. He drew from the business about £4 weekly. It was intimated that the debtor had already executed a deed of assignment with a view to protecting the assets. Recently creditors had pressed. The debtor was unable to make any offer, but he hoped that friends would assist him to retain the business. A resolution was passed confirming the deed already executed, and a committee of the principal creditors was appointed. It was arranged that the trustee and committee should deal with any offer that was received.

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S. L. STREETER, Petworth, electrical and wireless engineer and kinema proprietor.—A meeting of creditors was held on May 11th at the offices of the Palatine Trade Protection Office, Kimberley House, Holborn Viaduct, E.C., when Mr. P. S. Booth presented a statement of affairs which showed liabilities of £467 and net assets of £432, leaving a deficiency of £35. The debtor commenced business as a wireless and electrical dealer in April, 1925. In January of this year the debtor took over the "Picturedrome," Petworth. The turnover of the wireless business averaged about £400 a year. The debtor had interviewed friends to see if an offer could be made, but so far without success, and he left the matter entirely with the creditors. As there were suing creditors, Mr. Booth said that, in order to protect the assets, a deed of assignment had been executed by the debtor to him (Mr. Booth) as trustee. It was decided that the deed of assignment should be confirmed, and a committee of inspection, consisting of three of the creditors, was appointed. The following are the principal creditors:—

| | £ | | £ |
|---|---|---|---|
| Houghton-Butcher (G. B.), Ltd. ... ... | 91 | Radio Communication Co., Ltd. ... ... | 29 |
| Roneo, Ltd. ... ... | 47 | A. J. Stevens & Co. | |
| Woods, Ernest ... ... | 31 | (1914), Ltd. ... ... | 44 |

### Dissolutions of Partnership.

GREYCOAT IGNITION CO., electrical engineers, 27, Charles Street, Notting Hill, W.—Mr. R. Tricker and Mr. C. P. Holt have dissolved partnership. Debts will be attended to by Mr. Tricker.

BIRMINGHAM & MIDLAND ELECTRIC WELDING CO., electric welders and boiler repairers, Grove Works, Grove Lane, Smethwick.—Messrs. Frank Parkin, G. Price, Fred Parkin, J. W. Parkin, and H. Jones have dissolved partnership. Debts will be attended to by Messrs. Frank Parkin, G. Price, J. W. Parkin, and H. Jones, who will continue the business under the same style.

GOODMAN BROS., electrical and general engineers, Moretonhampstead, Devon.—Messrs. K. I. and W. R. Goodman have dissolved partnership. Mr. K. I. Goodman will attend to debts and continue the business in his own name.

WYCOMBE ELECTRICAL SUPPLIES, 51, Oxford Street, High Wycombe.—Mr. R. C. Gilbert, Mr. G. H. Turner, and Mr. D. Holt have dissolved partnership. Mr. Gilbert will attend to debts and continue the business.

### Local Exhibitions.

STEPNEY.—The exhibition organised by the Borough Council was visited by about 20,000 people, and all the exhibitors received a gratifying number of inquiries which are confidently expected to result in a considerable amount of business in the near future. At the Council's own inquiry bureau over 300 inquiries were recorded for all types of domestic apparatus. No fewer than 191 of these were for cookers. A hiring and hire-purchase scheme is in operation which, together with the attractive rates in force for heating and cooking, place the ratepayers of Stepney in a favourable position.

BERMONDSEY.—Reporting on the all-electric house on the Salisbury Street estate, which was arranged by the Electricity Department, the Electricity Committee states that a total of 11,360 people visited the house—an average of 630 per day. Fifty-eight applications for lighting installations were received from residents where the mains are already laid, and many inquiries were made for lighting in streets where there are no mains. Applications were received for the following apparatus: 20 cookers, 15 irons, 20 radiators, 5 geysers, 3 washing machines, 1 refrigerator, 1 fan, and 1 bedwarmer. Various shades and fittings were sold as a result of the consumers seeing them actually in use.

ABERDEEN.—A Brighter Homes Exhibition is to be held in the Music Hall from September 30th to October 11th. The exhibits will embrace heating, cooking, lighting, and labour-saving devices.

MANCHESTER.—The Power Efficiency Exhibition, which was to be held from June 22nd until July 2nd, has been abandoned on account of lack of support.

### For Sale.

Rushden and District Electric Supply Co., Ltd., has for disposal three 240-kW Willans Diesel engine generating sets, with oil tanks, pumps, &c., also one Garrett locomobile-type power plant, boiler, superheater and condenser, direct coupled to a 115-kW Phœnix dynamo, complete with steel chimney, &c. By order of Mr. James White and the Beecham Trust, Ltd., Messrs. Toplis and Harding & Russell, in conjunction with Messrs. Knight, Frank & Rutley, will sell by auction on June 2nd and 3rd, at the British Empire Exhibition, Wembley, electrical and fire equipment, office furniture, miscellaneous effects, &c. (See our advertisement pages to-day.)

### Book Notices.

"Towards Industrial Recovery," by Hugh Quigley. London: Methuen & Co. 4s. 6d. net.—Many of our readers who are familiar with the statistical and other writings of Mr. Quigley will no doubt read this book with interest. It comprises eight chapters, the earlier of which consider the changes that have taken place since the war in organisation for production in Britain, Germany, and France, and the main factors determining industrial recovery in Germany, France, and Belgium. Later pages deal with certain developments of international significance and the grouping of forces within industry, and the closing chapters discuss the control of industrial fluctuations and the basis of industrial revival. In this last connection the writer refers to the importance of management, the need of essential statistics, financial obstacles to reorganisation, trustification and central control, and the future of industry.

"*Journal* of the Institution of Electrical Engineers." Vol. LXV. No. 365. May, 1927. London: E. & F. N. Spon, Ltd. Price 10s. 6d.

The HART ACCUMULATOR CO., LTD., has produced for the help of present users of its lighting and power batteries a brochure describing the construction of the batteries and instructions for correct charging, care and maintenance, &c. The book is illustrated, and should be of great service to those for whom it is intended.

### New Australian Company.

Stromberg-Carlson (Australasia), Ltd., has been formed in Sydney, with a capital of £50,000, to manufacture, import and export electrical and mechanical engineering goods.

### Uruguayan Electrical Import Duties.

The section of the Uruguayan customs tariff relating to "articles for electricity" has recently been revised. Particulars of the revision are available from the Department of Overseas Trade, 35, Old Queen Street, S.W.1.

### Proposed Compulsory Safety Measures.

The Home Office has issued a circular to factory employers' associations in which it is said that progress in the development of safety-first arrangements is too slow. An Order requiring the institution of special safety arrangements has been provisionally approved, but is being held up pending representations on the subject from the employers. This Order would apply to all those industries in which accidents are frequent, with the exception of docks, for which, it is understood, voluntary arrangements are being made. Among the industries specially mentioned are dynamo, motor and cable manufacture. One part of the Order requires the employment of a competent safety supervisor, but with the Chief Inspector's approval an alternative arrangement can be made.

### Prices of Raw Materials.

The following prices are only general, and they may vary according to quantities and other circumstances:—

| CHEMICALS, &c. | | Price May 17th. | Fortnight's inc. or dec. |
|---|---|---|---|
| *a* Acid, Oxalic | per lb. | 6¾d. | — |
| *a* Ammoniac, Sal | per ton. | £80 | — |
| *a* Ammonia, Muriate (large crystal) | ,, | £52 | — |
| *a* Bisulphide of Carbon | ,, | ... | — |
| *a* Borax | ,, | £25 | — |
| *a* Copper Sulphate | ,, | £25 10s. | — |
| *a* Potash, Chlorate | per lb. | 1d. to 4¼d. | — |
| *a* ,, Perchlorate | ,, | 5½d. | — |
| *a* Shellac | per cwt. | £13 10s. | — |
| *a* Sulphur, Commercial | ,, | £9 10s. | — |
| *a* ,, Roll | ,, | £9 10s. | — |
| *a* Soda, Chlorate | per lb. | 3¼d to 3½d. | — |
| *a* ,, Crystals | per ton. | £5 to £5 5s. | — |
| *a* Sodium Bichromate, casks | per lb. | 4d. | — |
| **METALS, &c.** | | | |
| *b* Aluminium, Ingots | per ton | £107 to £113 | — |
| *b* ,, Wire | per lb. | 1/6 to 2/- | — |
| *b* ,, Sheet | ,, | 1/8 to 2/9 | — |
| *p* Babbitt's Metal and Anti-friction Metal— | | | |
| Grade I | per ton net. | £226 | £5 dec. |
| Grade II | ,, ,, | £174 | £4 dec. |
| Grade III | ,, ,, | £93 | £1 dec. |
| *c* Brass (rolled metal 2" to 12" basis) | per lb. | 9¾d. | ... |
| *c* ,, Tubes (solid drawn) | ,, | 11¼d. to 11¾d. | ... |
| *c* ,, Wire, basis | ,, | 9¾d. | ... |
| *c* Copper Tubes (solid drawn) | ,, | 1/0½ | ... |
| *c* ,, Bars (best selected) | per ton. | £86 | ... |
| *c* ,, Sheet | ,, | £86 | ... |
| *c* ,, Rod | ,, | £86 | ... |
| *d* ,, (Electrolytic) Bars | ,, | £61 12s 6d. | 2/6 inc. |
| *d* ,, ,, Sheets | ,, | £148 10s. | ... |
| *d* ,, ,, Wire Rods | ,, | £71 12s 6d. | 2/6 inc. |
| *d* ,, ,, H.C. Wire | per lb. | 9⅛d. | ... |
| *f* Ebonite Rod | ,, | 2/8 to 2/6 | ... |
| *f* ,, Sheet | ,, | 2/8 to 2/6 | ... |
| *a* German Silver Wire | ,, | 2/2 | ... |
| *h* Gutta-percha, fine | ,, | 8/- | ... |
| *h* India-rubber, Para fine | ,, | 1/5 | ... |
| *j* Iron Pig (Cleveland No. 3) | per ton. | 75/- | ... |
| *i* ,, Wire, galv. No. 8, P.O. qual. | ,, | £21 | ... |
| *g* Lead, English pig | ,, | £23 5s. | 20/- dec. |
| *g* Mercury | per bot. | £22 15s. to £23 | ... |
| *e* Mica (in original cases) small | per lb. | 6d. to 8/- | ... |
| *e* ,, ,, medium | ,, | 4/- to 8/- | ... |
| *e* ,, ,, large | ,, | 10/ to 20/- & up. | ... |
| *p* Phosphor Bronze, plain castings | ,, | 1/9½ | ... |
| *p* ,, ,, drawn bars & rods | ,, | 1/8 | ... |
| *p* ,, ,, rolled strip & sheet | ,, | 1/9½ | ... |
| *p* ,, ,, wire | ,, | 1/9½ | ... |
| *a* Platinum | per oz. | £28 | ... |
| *d* Silicium Bronze Wire | per lb. | 10½d. | ... |
| *r* Steel, Magnet, in bars | ,, | 7½d. | ... |
| *a* Tin, Block (English) | per ton. | £288 5s. to £288 15s. | £5 15s. to £6 5s. dec. |
| *a* ,, Wire, Nos. 1 to 16 | per lb. | 4/9 | ... |

*For 1 cwt. lots. Special quotations against definite specifications.

Quotations supplied by

*a* G. Boor & Co.
*b* The British Aluminium Co., Ltd.
*c* Thos. Bolton & Sons, Ltd.
*d* Frederick Smith & Co.
*e* F. Wiggins & Sons.
*f* India-Rubber, Gutta-Percha and Telegraph Works Co,. Ltd
*g* James & Shakespeare.
*h* Edward Till & Co.
*i* Bolling & Lowe.
*j* Richard Johnson & Nephew, Ltd.
*n* P. Ormiston & Sons.
*o* Johnson, Matthey & Co., Ltd.
*p* C. Clifford & Son, Ltd.
*r* W. F. Dennis & Co.

Reporting under date May 14th, Messrs. James Forster and Co. state that lead arrivals this month "are light, and it is to be hoped that this is the forerunner of smaller imports in future, in order to give the market a breathing space in which to absorb the warehouse stocks, and so get on to a healthier basis. It seems more probable that relief will come from a decrease in supplies rather than from an increase in consumption." Board of Trade returns for April, 1927:—Imports, 28,169 tons; exports, 1,682 tons; leaving for home absorption, 26,487 tons.

# Lighting and Power Notes.

**Alderley Edge.**—Purchase of Undertaking.—The Urban District Council has decided to join with the Wilmslow Urban District Council in negotiations for the purchase of the undertaking of the Alderley and Wilmslow Electric Supply, Ltd. Subject to an agreement to purchase being arrived at a Special Order providing for joint working will be applied for, together with powers to supply electricity in the two towns, and also to portions of the rural districts of Bucklow and Macclesfield and the urban district of Handforth.

**Argentina.**—Electrical Development.—The output of the power stations in Buenos Aires of the Compania Hispano-Americana de Electricidad (Chade) during the past year amounted to 534,002,536 kWh, an increase of 37,304,144 kWh over 1925. The number of consumers increased by 23,346, bringing the total up to 229,666, representing a load of 624,282 kW. At the main Dock-Sud power station the extensions are approaching completion. The fourth, fifth and sixth 25,000-kW turbo-generators are now in operation, and a seventh set of the same capacity will be ready for work by the opening of the next Argentine winter season. In order to meet the prospective increase in demand, orders have been placed for two new 40,000-kW sets, which, it is hoped, will be ready for working by the winter of 1928. Preparatory work on the new super-power station which is to be established by the company in Buenos Aires is now in progress, cementing operations in connection with the foundations having lately been commenced.

In the Buenos Aires suburb of Avellaneda the company is now supplying electricity to 21,444 consumers, as against 18,400 a year ago, the sales during 1926 having totalled 33,566,647 kWh, as compared with 30,305,626 kWh in 1925.

The Compania Empresa de Luz y Fuerza of Mendoza increased its output facilities during the past year by the inauguration in May of its hydro-electric plant at Cachenta. The company is now supplying energy to 12,993 consumers, the sales last year having amounted to 11,040,102 kWh, an increase of 2,049,509 kWh over 1925.

**Australia.**—Bunnerong Power Station.—According to the *Industrial Australian and Mining Standard*, considerable progress is being made in the erection of the power house at Bunnerong, which is being undertaken by the Sydney City Council. The total cost will be about £6,000,000. A feature of the work is the construction of twin tunnels, each three-quarters of a mile in length to provide 100,000,000 gallons of water an hour for condensing purposes. The drive is almost completed. On top, steam navvies, pneumatic drills, and a giant sluicing plant are transferring 140 cubic yards of rock and soil an hour into 26 acres reclaimed from the sea. Foundations for the boiler house, and the ashpits for the 18 boilers in the first section of the undertaking, are rapidly nearing completion. Erection of the steel framework of the building has commenced. It is stated that the work is well up to schedule time.

Forbes (N.S.W.).—Mr. R. T. Hole, supervising engineer for the Department of Public Works, Bathurst, held an inquiry recently into the Municipal Council's proposal to borrow £14,600 for the purpose of establishing an electricity undertaking. The total cost of the proposed work is to be £32,000.

**Barnsley.**—Supply for Housing Estate.—The Corporation Electricity Committee has recommended that the mains be extended to the Cundy Cross No. 2 housing scheme (139 houses), and provision made for public lighting, at an estimated cost of £1,342.

**Bedford.**—Loan.—The Town Council has applied for sanction to a loan of £8,700 for the supply of electricity in the Ampthill district. Subject to the consent of the Ministry of Transport, overhead cables will be used.

**Bradford.**—New Transformer Chamber.—The Corporation Electricity Committee has prepared a scheme for the provision and equipment of a district transformer chamber on the Low Well estate in Bolton Road district, at a total estimated cost, including land and the laying of distributing mains, of £7,538.

**Brentwood.**—Institution Supply.—The Essex Asylums Committee has adopted an electricity scheme for Brentwood Asylum, at an estimated cost of £22,700. The Committee proposes to install its own plant and to substitute electricity for gas for lighting purposes.

**Bristol.**—Extension of Supply.—In connection with the Corporation's application for an Order extending its area of electricity supply so as to include areas immediately outside the existing area, the Electricity Commissioners required an undertaking from the Corporation that mains would be laid in part of the area applied for within a period of two years from the date of the Order, if granted. The Electricity Committee has recommended the Council to give the required undertaking so far as it relates to mains in the parishes of Almondsbury, Tockington, and Olveston in the rural district of Thornbury. The estimated cost of laying mains in these parishes is £21,935, and the Committee is satisfied that the return upon the capital outlay involved will be satisfactory.

**Burton-on-Trent.**—Boiler Plant Extensions.—At an Electricity Committee meeting the electrical engineer submitted a report regarding extensions to the boiler house, and recommended that two additional 40,000-lb. boilers, complete with stokers, &c., be installed, that the old Lancashire boilers be removed, the old boiler house roof be raised to take one boiler, and that the new boiler house be extended for the second boiler. The bunkers would be extended, together with the coal handling plant. The total cost of these extensions would be approximately £40,000. The Committee has approved the report.

**Canada.**—New e.h.p. Line.—Permission has recently been granted by the Public Service Commission of Quebec to the Shawinigan Water and Power Co. to connect up the Anglo-Canadian Pulp and Paper Co.'s plant at Limoilu, near Quebec, with a 154,000-V transmission line. Power is being taken from the Duke-Price development on the Saguenay River at Ile Maligne, over 100 miles way, where the addition of two units last year brought the capacity up to 450,000 h.p.

Ontario.—A preliminary statement relating to the past year's working of the Hydro-Electric Power Commission of

Ontario shows that the combined revenue of the municipal undertakings served was $22,677,999, as compared with $20,419,115 in 1925, while the expenditure rose from $19,338,837 to $21,500,911. The net surplus thus increased from $1,080,278 to $1,177,811. Only 25 municipalities showed net deficits as compared with 42 in 1925. The percentage of net debt to total assets was reduced from 57.2 to 55.5.

**Carlisle.**—ELECTRICITY IN BULK.—The Electricity Committee has received an application from the Gretna and District Electric Supply Co., Ltd., to supply electricity in bulk, and intimating that the company had been in communication with the Electricity Commissioners with a view to an application being made for a Special Order. The Committee is to confer with the directors of the company as to the terms and conditions upon which a supply could be afforded.

**Colne.**—YEAR'S WORKING.—Mr. J. H. Thompson, borough electrical engineer, informs us that for the year ended March 31st last the revenue from the electricity undertaking amounted to £38,014, as compared with £33,676 in the previous year. Working costs increased from £19,510 to £24,385, leaving a gross profit of £13,629 (£14,166). After providing for capital charges, there was a net profit of £1,685, as compared with £3,173 in the preceding year. The maximum supply demanded decreased from 1,858 kW to 1,692 kW. The results of the year have been materially affected by the prolonged coal stoppage, but nevertheless the sales of electricity increased by 249,061 kWh to 3,420,164 kWh.

**Continental.**—POLAND.—La Société des Reseaux Electriques, which holds the concession for the supply of electricity in the towns of Sosnowice, Zabkowice, Zawiercie, Mijskow, Lodz, and the suburbs of Czenstochowa has nearly completed its distribution system, and hopes to be able to commence supply in the latter half of the current year. The company has entered into an arrangement to draw its electricity supply from the power station of the Société Centrale Electrique du Bassin de Dombrowa, the capacity of which is being increased from 10,000 to 22,000 kW.

PORTUGAL.—The Sociedad Union Electrica Portugesa has recently completed a steam-operated power plant with a capacity of 10,000 h.p., as a reserve for the Lima hydro-electric power station.

FRANCE.—The Paris City Council will have under consideration in June a report relating to the extension of the production and distribution of electricity in view of the growing demands. A special report has been presented to the City Council by the Prefect of the Seine, pointing out the necessity for a decision on the matter being arrived at in the immediate future. As under the most favourable circumstances it is impossible to envisage the practical execution of the scheme referring to the transport of energy from the Massif Central to Paris before 1933 or 1934, it is suggested that provision should now be made for the addition of a new steam power station of 100,000 kW. One solution would lie in the construction of a city works at Orby at a cost of 225 million fr., and a second would be the establishment of one at Vitry. The second solution would be less onerous, as it would involve an expenditure of 175 million fr., and it is this latter which is recommended by the Prefect to the Council.

GERMANY.—It is reported that the great Klingenberg power station of the Berlin Electricity Works has now been completed and put into service. The station comprises three main turbines, with a maximum capacity of 80,000 kW each, three other turbines of 10,000 kW each, and 16 boilers. There are six coal pulverisers. The City of Berlin has already invested some £3,500,000 in the station, and further sums will be required in the autumn to commence extensions, as the station in its present stage can only supply the demands of Berlin until 1930.

**Craven (Yorks.).**—ELECTRICITY SUPPLY.—The Electricity Commissioners have announced their decision with regard to the applications made last autumn for Electricity Orders in the Craven area of Yorkshire. That of the Electrical Distribution of Yorkshire, Ltd., with regard to Barnoldswick, Earby, Silsden, and 26 parishes in the Skipton rural area is refused, as also is that of the Keighley Corporation with regard to Silsden, Cowling, Farnhill, Glusburn, and Kildwick, while those of the Barnoldswick and Earby Urban District Councils for powers in their own townships are granted. The Silsden Council's application for its own area will be decided later. The Commissioners have intimated that they are prepared to proceed with the consideration of the application by the Electrical Distribution of Yorkshire, Ltd., regarding the remaining part of the area in the Skipton rural district.

**Gainsborough.**—ELECTRICITY SCHEME.—All the preliminary work in connection with the Council's electricity scheme has been completed, and a supply will be shortly available. The Council has decided to extend the mains to the new housing site at a cost of £3,000. The cost of wiring the new houses will be about £3 per house. The following scale of charges for the hire-purchase of fittings has been adopted:—Two points, 1s. 3d. per month for 120 months, 2d. per month being added for each light up to five and 3d. per month for each light from five to 20.

**Hazel Grove and Bramhall.**—LOANS SANCTIONED.—The Urban District Council has received sanction to loans of £8,000 for e.h.p. mains and £12,000 for l.p. mains, being part of an application for £35,000.

**Kendal.**—ELECTRICITY SUPPLY.—The Town Council has decided to engage an expert to advise on further extensions to the electricity works. As a bulk supply will not be available for at least five years, the Electricity Commissioners have recommended the Council to install two 335-kW crude oil engine sets which will meet the town's requirements for the next five years, one of the sets to be a spare.

**Kirkcaldy.**—ELECTRICITY EXTENSIONS.—The Town Council on May 9th approved a report on the extension of the Corporation electricity undertaking, involving an expenditure of £123,500, and agreed to carry out immediately the first part of the scheme at a cost of £87,200. The second stage, estimated to cost £36,300, has been postponed until it is found to be necessary. It was also agreed to apply for sanction to borrow £87,200 to meet the cost of the first part of the scheme. The report by Messrs. Kennedy & Donkin recommended that the Corporation should change its l.p. distribution system from d.c. to a.c. in two stages. The first stage would affect the outlying areas to the north and south and would necessitate the laying of a new distributing network and mains and the erection of static transformer substations. The second stage would be carried through during the next five to seven years. It affected the centre area, and therefore the change-over should be progressive. It should start with the completion of the first stage on the fringes of the central d.c. area, and should progress inwards as the load increased and as conditions arose. The capacity of the transforming plant in the new sub-stations proposed would meet the demand for the next ten years, but at a later date it would be necessary to build additional sub-stations interposed between the others. It is considered that, as far as possible, the Corporation should discontinue taking the load of factories on its l.p., d.c. network, and that these factories should be supplied from its other mains. It would be impracticable to change over all of them at once. It is expected that the work will begin in August, and that certain parts will be completed by the end of next winter.

**Leicester.**—ELECTRICITY EXTENSIONS.—The Electricity Committee has submitted to the City Council a report prepared by the engineer and manager (Mr. T. R. Smith) on proposed extensions to the electricity undertaking, involving an estimated expenditure of £640,000, and the provision of additional mains, services and meters to meet requirements during the next two years, at an estimated cost of £183,000. The extensions include new buildings, cooling towers, coal and ash-handling plant (£194,000), two 25,000-kW turbo-alternators with condensing plant, and four boilers (£446,000), mains and services (£163,000), and meters (£20,000). The engineer estimates that when these extensions have been completed the cost of generation and distribution, including the additional charges for interest and sinking fund, will be reduced by about 13 per cent., and that the needs of the city will be met for the next seven years. The Council has adopted the report, and application is to be made to the Electricity Commissioners for sanction to the scheme.

**Lincoln.**—LOAN.—The Town Council has applied for sanction to a loan of £39,600 to cover the cost of a scheme for the supply of electricity in the south-west part of the city, and for extensions.

**London.**—CHISWICK.—The Conference of Local Authorities Owning Electricity Undertakings in Greater London has considered the scheme which is being promoted by the London and Home Counties Joint Electricity Authority for the purpose of enabling the Authority to acquire a site at Chiswick for the erection of a principal power station to deal with the demand for electricity in the west and north-west electricity district. The Conference agrees in principle with the proposal, it being considered highly desirable that the station should be owned and operated by the Joint Authority. The Conference is also of opinion that the erection of the station should be expedited.

**Manchester.**—PROGRESS DURING MARCH.—During the month of March the Corporation electricity undertaking showed an increase in connections of 12,170 kW, bringing the total to 316,638 kW; and the number of applications received for supply, including consumers for additional supplies, was 1,138, representing a total of 3,305 kW. The number of hired cookers connected increased by 112, bringing the total actually on circuit to 3,029. Applications for the hire of cookers totalled 166. Two new sub-stations were put into commission at Burnage and Droylsden (West), and additional plant installed at three existing sub-stations.

**Malvern.**—NEW CABLE.—The Urban Dsitrict Council is to lay a duplicate h.p. feeder cable from the electricity works to Malvern Links in order to provide an alternative supply for the West Malvern and Malvern Links areas, at an estimated cost of £1,284.

**Peterborough.**—NEW ELECTRICITY CHARGE.—The Town Council has adopted a new two-part domestic tariff, the basis of which is 12½ per cent. on the ratable value of the premises, plus £1 per annum service charges, and 1d. per kWh for electricity consumed

**Portsmouth.**—LOAN.—The Corporation Electricity Committee is applying for sanction to a loan of £125,000 for mains and services.

**Price Reductions.**—Reductions in the charges for electricity have been made or recommended in the following districts:—

NEWMARKET.—*The Newmarket Electric Light Co., Ltd.*—Lighting: Reduced to 10d. per kWh. Power and heating: Reduced to 6d. per kWh.

STROUD (GLOS.).—*The Stroud Electric Supply Co., Ltd.*—An all-round reduction of 1d. per kWh.

PEMBROKE (DUBLIN).—Lighting: A reduction of 1d. Cooking, heating, and power: A reduction of ½d. per kWh.

SHOREDITCH.—Heating: The addition of 25 per cent., which has been in force since December last, has been withdrawn.

**Plympton St. Mary.**—ELECTRICITY IN BULK.—It was announced at a recent meeting of the Rural District Council that terms have been arranged for a bulk supply of electricity from Plymouth Corporation. The first districts which are to be supplied with electricity are Plympton, Plymstock, Crownhill, and Compton; tenders have been received and the work of linking-up will be commenced as soon as possible.

**South Africa.**—SIMONSTOWN.—The Municipal Council, which has hitherto obtained its electrical supply from the Naval Dockyard, has now completed arrangements for a supply from Cape Town Corporation. The latter authority will also give a supply to the village of Glencairn, near Simonstown.

**Special Orders.**—Applications have been made to the Electricity Commissioners for a Special Order by the Urban Electric Supply Co., Ltd., to extend its area of electricity supply so as to include certain parishes in the rural districts of Newbury and Kingsclere.

The Commissioners have submitted to the Minister of Transport for confirmation Special Orders made by them authorising Gloucester Corporation to supply electricity in the rural district of Gloucester, and the Torquay Corporation to supply within parts of the rural districts of Newton Abbot and Totnes.

**Stourport.** — INAUGURATION OF POWER STATION. — The generating station of the Shropshire, Worcestershire and Staffordshire Electric Power Co. is to be formally inaugurated by the Premier and Mrs. Baldwin on June 2nd.

**Stretford.**—LOANS.—The Urban District Council is to apply for sanction to the borrowing of £20,000 for l.p. mains and services, and £8,520 for h.p. mains.

**Torquay.**—ELECTRICITY EXTENSIONS.—The Corporation is to erect a sub-station at Thatcher Pines, and lay h.p. and l.p. mains, at an estimated cost of £3,361, in order to provide a supply of electricity to the Ilsham Marine Drive district.

**Tunbridge Wells.**—ELECTRICITY IN BULK.—The Town Council has arranged to give a bulk supply of electricity to the Crowborough District Gas and Electricity Co. for a period of ten years, terminable by 24 months' notice, such notice not to be given without the consent of the Electricity Commissioners. The price is to be £2 5s. per kVA of maximum demand, plus 1d. per kWh.

**Wakefield.**—STREET LIGHTING.—After considering a report of the electrical engineer, together with a statement by the street lighting superintendent, showing the comparative costs of gas and electricity for street lighting, the Corporation has decided to invite an expert to report on the street lighting system, and outline the best methods of development under local conditions. Data are to be obtained showing the complete costs of gas and electricity for lighting along streets where mains are already laid.

# Tramway and Railway Notes.

**Bournemouth.**—LOAN.—The Town Council is to apply for sanction to a loan of £18,000 in connection with the doubling of the tramway track from the Cemetery Junction to the top of Rochmond Hill.

**Continental.**—ITALY.—The newly-electrified line between Pistoia and Bagni-della-Perretta will be opened on May 24th. The plant is practically completed and the rolling stock is on the spot. On October 28th the entire electrified line between Florence and Bologna will be formally inaugurated.—*Reuter's Trade Service* (Milan).

The length of electrified railways in Italy at the end of 1926 was 1,093 km. To this should be added the Pistoia-Perretta line and 132 km. from Bologna to Florence mentioned above. Of the lines constructed, 605 km. are double track and 488 km. single. The traction system is 3-phase, 3,700 V, with two aerial phases, except on the Milan-Varese-Porto Ceresio and the Naples-Pozzuoli lines, which are operated with d.c. at 650 V. Included in the above total is a line of 11 km. in French territory operated on account of the Paris-Lyons-Mediterranée Company.—*Reuter's Trade Service* (Rome).

**East Ham.**—DOUBLING OF TRACK.—The Corporation Tramways Committee has had under consideration the report of a conference convened by the L.C.C. relative to the cost of the duplication of the tramway track at the "Bull" Corner, Barking, and recommends that the action taken by the delegates in agreeing to bear a proportion of the annual capital charges of reconstruction be approved, subject to the other authorities concurring with the proposals.

**India.**—RAILWAY ELECTRIFICATION.—The development of the suburbs of Calcutta and the expansion of the city with a view to relieving congestion and to counteracting soaring house rent has been the concern of the Government of Bengal for nearly a decade. According to *Indian Engineering*, a comprehensive scheme for the electrification of the suburban railway system has been drawn up by the Eastern Bengal Railway and submitted for consideration to the Railway Board. No details of the scheme, however, are at present available. If approved by the Railway Board, the scheme will be submitted to the Secretary of State in Council for sanction.

**Japan.**—ELECTRIC RAILWAY SCHEMES.—It is reported that the Nügata Electric Co., Ltd., has applied for a charter in connection with a scheme for the construction of an electric railway between Nügat and Yahiko, a distance of 21 miles. The cost of the scheme is estimated at 2,000,000 yen.

The Municipal Council of Tokio has applied to the Government for sanction to commence work on the construction of underground railways in the city, at a cost of 17,000,000 yen.

With regard to the electrification of lines of the South Manchurian Railways, it is understood that it has been finally decided to electrify the Dairen, Fushun, Aansan, and some other lines, commencing the work of construction in the fiscal year of 1928-1929.

**Liverpool.**—LOAN SANCTIONED.—The Corporation Tramways Committee has received sanction to the borrowing of £100,000 for the erection of a new car shed, works and offices at Edge Lane.

**Wolverhampton.**—TRANSPORT DEVELOPMENT.—According to the *Electric Railway and Tramway Journal*, important developments in connection with the transport facilities between Wolverhampton and the Black Country are foreshadowed in an announcement that the Corporation has come to an agreement with the Wolverhampton and District Electric Tramways Co., Ltd., for the purchase of the company's interests from the borough boundary to Bilston, to the Bull Stake, Darlaston, and also from the Square at Willenhall to the Fighting Cocks, which is the borough boundary on the Dudley route from Wolverhampton. It is proposed to remove the existing tramway track from these roads, to introduce railless cars on the route to Darlaston, and to run motor-omnibuses on the section from Willenhall to the Fighting Cocks. This is in accordance with the policy of the Corporation to scrap the tramway on all routes, and to substitute either railless cars or omnibuses.

# Telegraph and Telephone Notes.

**Belgium.**—LONG-DISTANCE TELEPHONY.—At the annual meeting at Charleroi of the Société des Ateliers de Constructions Electriques, the chairman reported that good progress was being made with the new telephone cables for the Belgian Post and Telegraph Authorities. That between Brussels and La Panne was completed some time ago and had successfully passed all the tests. The Brussels-Rosendael cable had been laid, and that between Brussels and Lille was well in hand. As a result of the successful carrying through of this contract the company had now been entrusted with the order for the telephone cables between Brussels and Luxemburg, and between Brussels, Charleroi, and Mons.

**New Zealand.**—TELEPHONE REPEATERS.—The increase in telephone traffic and a demand for telephone communication between the two islands comprising the Dominion have resulted in the laying of the first submarine telephone cable across Cook's Strait, which separates the North and South Islands. Siemens Brothers & Co., Ltd., of Woolwich, have supplied a four-core, continuously-loaded, gutta-percha insulated cable, which has been laid between Wellington and Seddon (a small station on the South Island), its length being 45 nautical miles. It will provide three telephone circuits: two physical and one phantom. To enable the cable to be linked with the long trunk land lines on either side, Siemens Brothers also supplied telephone repeater stations, one at Seddon and one at Wellington. They are two-wire cord circuit repeaters, and can be connected to any of the trunk wires radiating from the cable-terminating stations. Although the installation of this equipment is as yet far from complete, use was made of it recently in connection with the visit of

the Duke and Duchess of York to the Dominion, when conversations took place between Wellington and Dunedin, over 400 miles to the south, at 36 hours' notice.

**Russia.**—AUTOMATIC TELEPHONY.—In the latest bulletin issued by the L. M. Ericsson Co., of Stockholm, Sweden, it is stated that the Company is to build and equip a 10,000-line exchange for the city of Rostov in South Russia. At present the Company has under construction no fewer than 18 automatic exchanges, of which three are in Sweden, one in Norway, one in Holland, eleven in Italy, one in Poland, and one in South Africa.

**The Telephone Service.**—GROWTH IN 13 YEARS.—Figures showing the growth of the telephone service since the Post Office took it over in 1912 have just been issued by the Board of Trade. When the Post Office took charge, there were 730,821 stations (telephone instruments) in use, and 797,000,000 local calls were made. In 1925 and 1926 there were 1,390,156 stations and 1,016,000,000 local calls were made. This figure represents a lower calling rate per telephone than that of 1912. The war caused a heavy decrease in the number of local calls: in 1913 there were 834,000,000 calls, but during the four war years they fell to 776; 701; 700; and 716 millions respectively. In the first year following the war they jumped back to 848 millions. Trunk calls, on the other hand, rose during the war period from 38,200,000 to 46,500,000. The income from the service increased steadily over almost the whole period from 1912 to 1926, and was only slightly affected by the war: in 1911-12 it was £5,847,410, and in 1925-6 it was £16,163,206. The only set-back was a drop of nearly £1,000,000 immediately after the war, which fall was recovered in two years.

NEW ANGLO-BELGIAN CABLE.—The Postmaster-General announces that the laying of the new Anglo-Belgian telephone cable has been completed, and that improved service is now available between this country (both London and the provinces) and all the principal towns in Belgium. On May 15th the then current charges ceased to apply, and new rates and conditions of service came into force.

**Transatlantic Radio-telephony.**—COMMITTEE'S REPORT.—The report of the Committee on Transatlantic Wireless Telephony (H.M. Stationery Office, Cmd. 2,858, price 2d. net) outlines the history of the service, which was opened for commercial public use on January 7th, 1927. The Committee, which has completed its work, recommends that the improvement of the present partially secret system should be pressed to a conclusion by the British Post Office engineering staff in consultation and co-operation with the American Telephone and Telegraph Co.

**United States.**—UNUSUAL CABLE FAULT.—On April 3rd, the Alaska cable failing to function, the Government sent the cable ship *Dellwood* out from Seattle to locate the trouble. After several days' effort she located the break off Cape Flattery on April 7th, and the line was picked up in 600 fathoms of water. Attached to the twisted wires of the cable was a twenty-ton whale, which had severed the wires in several places and in some manner caught them fast in its jaws. The cable ship cut the whale loose and cast it adrift, but brought back several sections of the damaged cable to Seattle; the strands were so badly twisted that it was almost impossible to separate them. According to *T. & T. Age*, this is the second recorded case of a whale breaking an ocean cable, the Seattle-Sitka cable having previously been broken in the same manner 22 years ago.

# Radio Notes.

**Another "Wireless Exchange."**—SECOND IN ENGLAND.—The second wireless "exchange" to be licensed in this country has started operations at Southsea. The owner is Mr. J. Tubb, who, with a four-valve receiver, is supplying his neighbours with broadcast programmes from the Daventry station at a charge of 1s. 6d. a week. The other exchange is at Southampton, and has been working for nine months. Would-be subscribers have first to obtain a wireless licence and to pay for a loud-speaker and a switch supplied to them by Mr. Tubb. The house is wired free of charge, and, by an automatic device, the first subscriber to switch on his loud-speaker switches on the valves of the receiver. So successful is the scheme, says the *Morning Post*, that the Southsea Corporation has granted permission for a line to be taken over a street, where it connects with another block of houses. Such schemes are working with success in New York.

**Hungary.**—LICENCES.—In March, 1927, the number of wireless subscribers in Hungary was 70,899, an increase of 1,868 during the month.—*Reuter's Trade Service* (Budapest).

**United States.**—RECEIVING SETS ON FARMS.—There are now 1,252,126 farms in the United States equipped with wireless receiving sets, the Radio Service of the Department of Agriculture announces in a report on its past season's work. The estimate was based on returns made by country agricultural agents, and showed a 126 per cent. increase on the estimated 553,008 sets on farms in July, 1925. Iowa led the States with 99,990 farm radio sets, or an increase of 160 per cent. since 1925. Indiana came second with 81,144, but this figure represented an increase of 377 per cent., as compared with the 1925 figures. American farmers are not using wireless merely for entertainment; the day's work is now planned according to the weather forecasts sent out by the Weather Bureau and received by radio much more quickly than was formerly possible; market reports issued by the Federal Bureau of Agricultural Economics are also eagerly followed.—*Reuter's Trade Service* (Washington).

PART-TIME STATIONS.—Twenty-eight of the forty-six broadcasting stations authorised to operate in New York City under temporary permits will be obliged to divide time, according to an announcement of the Federal Radio Commission. Fifty-seven stations were operating in New York City when the Commission took up its duties. Nine failed to apply for temporary permits. All stations in the New York area are now licensed at separation intervals of a minimum of twenty kilocycles, says *World Radio*, and in many cases thirty, forty, and fifty kilocycles' separation between stations has also already been arranged.

# Contract Information.

**When "Contracts Open" are advertised in our "Official Notice" pages, the date of the ELECTRICAL REVIEW containing the advertisement is given in parentheses below.**

## Contracts Open.

**Aberdare.**—June 2nd. Electricity Department. E.h.p. overhead and underground main and branch transmission lines. (May 13th.)

**Armagh.**—June 7th. Urban District Council. Heavy oil engine generating plant, underground and overhead mains. **(May 13th.)**

June 7th. A.c. switchboard and overhead travelling crane. (See this issue.)

**Australia.**—MELBOURNE.—July 5th. State Electricity Commission. One 15,000-kW steam turbo-generator and accessories. (B.X. 3369.)*

July 4th. 66,000-V and 22,000-V insulators for the Yallourn brown coal scheme. (May 6th.)

June 28th. Postmaster-General's Department. Jacks, switchboard instruments, &c. (B.X. 3474.)*

SYDNEY.—June 20th. Municipal Council. Turbo-alternators for Bunnerong power station. (B.X. 3443.)*

**Basingstoke.**—June 7th. Corporation. Electrical installations at the Council's housing estate (approx. 1,015 wiring points). **(May 13th.)**

**Chile.**—SANTIAGO.—July 18th. Chilean State Railways. Materials for electric lighting and power (Group 30). Materials for electric lighting of locomotives and coaches (Group 32). August 22nd. Signalling, telegraph and telephone supplies (Group 36.) (C.X. 2271.)*

**Darlington.**—May 23rd. Electricity Committee. One 500-kW rotary convertor, with transformer. (May 6th.)

**Dublin.**—May 23rd. Electricity Department. Pipework for a 5,000-kW turbo-alternator. (May 6th.)

**Dundee.**—May 25th. Council Fire Department, 27 cast-iron fire-alarm telephone boxes, the price to include delivery at the Central Fire Station.

**Edinburgh.**—May 23rd. Education Authority. Electric installation at Abbeyhill (New), Dalry, and Victoria schools. Schedules from the offices of the Authority.

**Egypt.**—CAIRO.—June 4th. Egyptian State Railways, Telegraphs and Telephones, Chief Inspecting Engineer, Queen Anne's Chambers, S.W. Underground cables (approx. £E12,000 to £E13,000).

May 28th. Ministry of Education. Electrical equipment for Beni Suef Trades School. (B.X. 2488.)*

**Epsom.**—Electricity Department. E.h.p. cable. (May 6th.)

**Glasgow.**—May 23rd. Corporation. Electric lighting installation for McNeil Street Rehousing Scheme. Specifications, &c., from Mr. R. B. Mitchell, engineer, 75, Waterloo Street.

**Grimsby.**—June 4th. Electricity Department. Sub-station equipment. (May 13th.)

**Hull.**—June 16th. Electricity Department. Steel coal bunker and conveyor housing. (See this issue.)

**India.**—June 14th. India Stores Department, Simla. Generating sets for Fyzabad power station. (B.X. 3486.)*

**Ilford.**—June 1st. Electricity Department. E.h.p. and l.p. paper-insulated cables. (See this issue.)

**London.**—H.M. OFFICE OF WORKS.—May 27th. Incandescent electric lamps. (See this issue.)
June 3rd. 5-ton gantry crane. (See this issue.)
HAMMERSMITH.—June 1st. Electricity Department. Cables, transformers, h.p. switchgear and ironclad feeder switchgear. (See this issue.)

**Manchester.**—May 30th. Electricity Department. L.p. valves for circulating water system, two electrically-driven and one steam-driven boiler feed pumps. (May 13th.)
June 1st. Education Committee. Electric lighting installation at Levenshulme High School for Girls. Specification, &c., from Education Offices, Deansgate.

**Middleton.**—May 23rd. Wiring for electric light, Rhodes Council School. Specification from borough electrical engineer, Corporation Street, Middleton.

**New Zealand.**—AUCKLAND.—July 4th. Auckland Electric Power Board. Switchgear. (B.X. 3471.)*

**Pudsey.**—June 14th. Electric light installation at the School of Art. Specifications from Education Department, County Hall, Wakefield.

**Richmond-on-Thames.** — May 23rd. Municipal Water Department. Electrically-driven centrifugal pump, with motor, &c. Mr. H. P. Williamson, engineer, Riverside.

**Scarborough.**—June 3rd. Corporation. Installation of electrical pumping plant in duplicate for the new Irton water scheme No. 2. Specifications (£5) from Dr. H. Lapworth, engineer, 25, Victoria Street, S.W.

**South Africa.**—CAPE TOWN.—June 30th. South African Railways and Harbours Board. Gasfilled and vacuum lamps for 12 months. (B.X. 3518.)* Telegraph material (B.X. 3519.)*

**Stirling.**—May 27th. Corporation. Electrical work at 96 houses. Specifications from Mr. Andrew H. Goudie, burgh surveyor.

**Tynemouth.**—June 11th. Electricity Department. One voltage regulating transformer. (May 13th.)

**Whitley.**—Electricity Department. One 1,000-kW turbo-alternator, with condenser, pumps, air filter, &c.; one 200-kW semi-Diesel or heavy-oil engine alternator. (May 6th.)

* Further particulars can be obtained at the Department of Oversea Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

# Contracts Closed.

**Barnes.**—Urban Council. Accepted:—
Duplicate 1,000-kW rotary convertor panel (£230).—English Electric Co., Ltd.

**Birkenhead.**—Electricity Committee. Accepted:—
Panel at Sungleton Avenue sub-station (£117).—Ferguson, Pailin, Ltd.
Cubicle at Heath Road sub-station (£143).—Metropolitan-Vickers Electrical Co., Ltd.

**Burton-on-Trent.**—Electricity Committee. Accepted:—
Six 25-kVA transformers (£266).—British Electric Transformer Co., Ltd.

**Bury St. Edmunds.**—Electricity Committee. Accepted:—
Feeder cable (£690).—Callender's Cable & Construction Co., Ltd.

**Croydon.**—Libraries Committee. Recommended:—
Electric light installation, Ashburton library (£122).—A. E. Cook.
Electricity Committee. Accepted:—
Artesian well (£1,108).—Le Grand Sutcliffe & Gell, Ltd.

**Dartford.**—Electricity Committee. Recommended:—
Supplying and laying cable at East Hill (£1,953).—Power Lines Construction Co., Ltd.

**Douglas (I.O.M.).**—Electricity Committee. Accepted:—
Contract for mains (£6,259).—Siemens Bros. & Co., Ltd.

**Dundee.**—Corporation Cleansing Committee. Accepted:
Installing electric light at Broughty Ferry Cleansing Depot.—Marshall, Hutton & Co.

**East Ham.**—Electricity Committee. Recommended:—
Cable (£4,314).—Enfield Cable Works, Ltd.
Four feeder panels (£326).—Bertram Thomas.

**Gravesend.**—Electricity Committee. Recommended:—
Removing existing 200-kW units from Queen Street to El Teb and providing a 600-kW induction regulator controlled extension at Queen Street (£4,664).—Hewittic Electric Co., Ltd.

**Hull.**—Education Committee. Accepted:—
Installation of electric light at Park Avenue School (£376).—Alexander Shaw & Sons.

**Ilford.**—Electricity Committee. Recommended:—
100-kVA transformer (£116).—Foster Engineering Co., Ltd.
500-kW convertor with automatic control and B.E.T. type transformer (£3,441).—Crompton & Co., Ltd.
1,000 kW rotary convertor (£6,608).—Metropolitan-Vickers Electrical Co., Ltd.
Pavement frames and covers.—W. T. Henley's Telegraph Works Co., Ltd.
Meters.—Edison Swan Electric Co., Ltd.; Ferranti, Ltd.; R. Hornby & Co., Ltd.; Landis & Gyr, Ltd.; and Measurement, Ltd.

**India.**—India Store Department. Accepted:—
26,775 inert dry cells.—Fuller Accumulator Co. (1926), Ltd.

**Irish Free State.**—Commissioners of Public Works. Accepted:—
Electric lighting installation at the Custom House, Dublin.—Gleeson, O'Dea & Co., Ltd.—*Irish Builder and Engineer.*

**Lamp Contracts.**—Renfrewshire Combination Hospital has placed a contract for metal filament lamps with Edison Swan Electric Co., Ltd.
The General Electric Co., Ltd., has received contracts from the General Post Office for 75,000 Robertson carbon-filament telephone switchboard lamps, and from Turton Urban District Council for a 12 months' supply of "Osram" metal-filament vacuum lamps.

**Leeds.**—Tramways Committee. Accepted:—
Electrical sundries.—Electric and General Stores, Ltd.; British Thomson-Houston Co., Ltd.; L. Andrew and Co.; Micanite & Insulators, Ltd.; Insulation Manufactures, Ltd.; and Hammett & Andrew.
Electrodes.—G. D. Peters & Co., Ltd.
Electricity Committee. Accepted:—
Cable (£2,465), Macintosh Cable Co., Ltd.; (£894), Enfield Cable Works, Ltd.
Parks Committee. Accepted:—
Three electric launches (£600).—R. F. Winder, Ltd.

**London.**—ST. PANCRAS.—Contract and Stores Committee. Recommended:—
L.p. cable (£1,005).—Hackbridge Cable Co., Ltd.
H.p. cable (£224).—Siemens Bros. & Co., Ltd.; (£330) Standard Telephones & Cables, Ltd.
Davison patent flue dust collector (£1,895).—International Combustion Co., Ltd.
LONDON COUNTY COUNCIL.—Education Committee. Accepted:—
Electric wiring and fittings at Drayton Park school (£290).—Bailey & Incledon, Ltd.
BERMONDSEY.—Maternity Committee. Accepted:—
Lighting plant at Fairby Grange Institution.—Broadwell Engineering Co.
WESTMINSTER.—Housing Committee. Recommended:—
Electric wiring and fittings at Drayton Park school (£290).—Rashleigh Phipps & Co.
CROWN AGENTS FOR THE COLONIES. Accepted:—
Tram lighting cells in wood-lined containers.—Fuller Accumulator Co. (1926), Ltd.

**Manchester.**—Electricity Committee. Accepted:—
Two 250-kVA and three 500-kVA transformers.—Bruce Peebles & Co., Ltd.

**Prestwich.**—Highways Committee. Accepted:—
Electric lamps.—Edison Swan Electric Co., Ltd.

**Swansea.**—Education Committee. Accepted:—
Electric wiring, Sketty mixed school (£130), Cole & Day; Sketty infants' school (£135), H. Norman Kirk; Cwmbwrla school (£137), G. L. Ward & Co.
Electricity Committee. Accepted:—
Auxiliaries for 10,000-kW set (£1,805).—Hick, Hargreaves and Co., Ltd.
Steam-driven boiler feed pump (£585).—G. & J. Weir, Ltd.

**Torquay.**—Electricity Committee. Accepted:—
2,000-kVA transformer (£1,140).—C. A. Parsons & Co., Ltd.
Switchgear (£797).—British Thomson-Houston Co., Ltd.
50-ton travelling crane at Newton Abbot (£2,400).—Royce and Co.

**Wakefield.**—Electricity Committee. Accepted:—
Renewing battery of electric vehicle (£138).—Chloride Electrical Storage Co.

**Wrexham.**—Town Council. Accepted:—
Installing electric light at houses at Acton Park at £562.—William Bright.

# Forthcoming Events.

**Association of Mining Electrical Engineers (North of England Branch).**—Saturday, May 21st. Annual general meeting.

**Faraday Society.**—Wednesday, May 25th. 8 p.m. Annual general meeting.

**Institute of Wireless Technology.**—Wednesday, May 25th. 71, Kingsway, W.C.2. 7 p.m. Annual general meeting.

**Incorporated Radio Society of Great Britain.**—Wednesday, May 25th. Institution of Electrical Engineers, London. 6 p.m. "The Hot Wire Microphone and Audio Resonant Selection." Mr. G. G. Blake.

**Institution of Production Engineers.**—Friday, May 27th. 83, Pall Mall, S.W. 7.30 p.m. "Rate Fixing." Mr. J. Ronald.

**Physical Society.**—Friday, May 27th. Imperial College of Science, South Kensington, S.W. 5 p.m. Ordinary meeting.

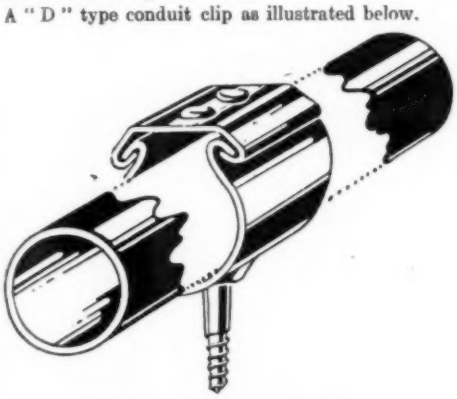
**Incorporated Municipal Electrical Association.**—May 30th to June 4th. Buxton. Annual Convention.

# The "Electrical Review" Service Department.

INQUIRIES must be accompanied by a stamped addressed envelope.

We should be glad to learn the name and address of makers of the following:—

A "D" type conduit clip as illustrated below.



# Notes.

### The First European 380-kV Transmission Line.

With reference to the note under the above heading on page 765 of our May 13th issue, we understand that, while the hollow conductor has been calculated to prevent corona discharge taking place at 380 kV, its operating pressure will not be so high as that. The line will operate at 220 kV.

### Fatalities.

Whilst employed at the Bridgend electricity works, Jack Power, a driver, recently came into contact with "live" apparatus and received a fatal electric shock.

Thomas Owen Thomas, assistant crane-driver at the Margam Iron and Steel Works, Port Talbot, received an electric shock which proved fatal.

### The L.C.C. Tramways.

At a recent meeting of the London County Council, Mr. C. W. Matthews discussed the estimates of the tramway undertaking showing an estimated net deficiency of £302,114 for the financial year 1926-27, and of £222,439 for 1927-28. *The Times* reports that Mr. H. Morrison maintained that the tramway undertaking could not be regarded simply as a commercial concern. It was a public service, which tended to keep all traffic fares down to a reasonable level. The present estimates were somewhat misleading, because they did not make it sufficiently clear to the public that repayment of debt was included in the deficit. Mr. J. D. Gilbert said that, taking the deficits of the last seven years, he found that, on deducting redemption of debt, there was really a profit on working. Last year's figures would have been much more favourable had it not been for the general strike. Mr. Angus Scott pointed out that the present competition made it impossible for the tramway undertaking to pay its way. It remained to be seen what help the Ministry of Transport would afford, for it was unwise to extend the system unless there was some guarantee of a reasonable return.

### Appointments Vacant.

Lady demonstrator (70s.) for the Liverpool Corporation Electricity Supply Department. Junior charge engineer for the Borough of Loughborough Electricity Department. Colliery electrician (£400) for the Government of Nigeria. Deputy borough electrical engineer (£605), for the Corporation of Hastings Electricity Department. Head of Electrical Engineers' Department (£500), for the Rutherford Technical College. (See our advertisement pages to-day.)

### I.E.E. Annual Meeting.

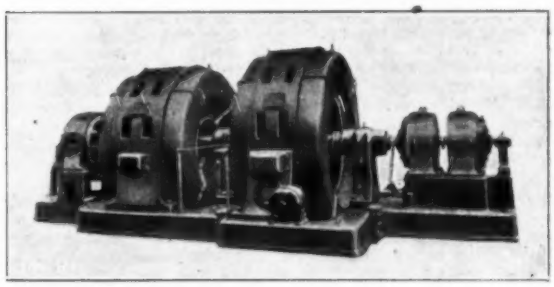
CORRECTION.—In the report of the annual general meeting of the Institution of Electrical Engineers on page 778 of our May 13th issue the remarks of Mr. W. A. Erlebach, B.Sc., M.I.E.E., were ascribed to Mr. Hurlbatt. The error is regretted.

### Electrical Equipment for an Airship.

An interesting contract for the complete electrical equipment of a new airship, which will be much larger than any hitherto constructed, has been placed with the Metropolitan-Vickers Electrical Company. The new giant dirigible is the R100, which is being built at North Howden, Yorkshire, by the Airship Guarantee Company, Ltd. It will have a capacity of 5,000,000 cubic feet of gas, and accommodation will be provided for 100 passengers and 50 crew. The electrical equipment is to provide a service for compartment and navigation lighting, compartment heating, cooking and water heating, and wireless signalling. A direct-current system has been adopted, and a special scheme has been worked out by the Metropolitan-Vickers Company to meet the unusual requirements, in which considerations of safety and minimum weight of apparatus are of paramount importance. Two 25-kW generators are to be installed in the machinery cars, where they will be driven by the small petrol engines which will be used for starting the main driving engines of the ship. Casings of apparatus and most of the fittings throughout the ship will be of light alloys, while for the wiring system a cable with conductor and armouring sheath, both of aluminium, specially manufactured by Messrs. Glovers, Ltd., will be used. Safety features include a special protective system which will not only guard against damage to the equipment by overload or short circuit, but also ensure that open sparking cannot be produced by any fault on the line. The special construction of the wiring cable contributes to this protection. The armouring of the cable is strong, yet capable of considerable extension, so that in the event of undue strain the conductor will break first and the armouring will contract round the point of fracture, thus preventing any external spark. Flameproof casings will be used for all apparatus and fittings.

### Electricity Supply in South Wales.

In connection with the description of the Upper Boat generating station of the South Wales Electrical Power Distribution Co. in our issue of May 6th, we are informed that Messrs. Bruce Peebles & Co., Ltd., were the manufacturers of the two frequency changers installed to give a 50-cycle supply to the Great Western Railway Docks. Each of the sets is designed to develop 2,000 kW, their speed being 375 r.p.m., and is provided with a starting motor and two exciters, one



**Peebles 2,000-kW Frequency Changer.**

for each machine. The synchronous motors operate on a 3-phase, 25-cycle, 11,000-V circuit at unity power factor, and the alternators develop 2,500 kVA at 0.8 power factor and generate 3-phase, 50 cycles at 11,000 volts. The alternators are provided with motor-operated stator rocking gear, the motor for operating which can clearly be seen in the accompanying illustration. The starting motor develops 300 b.h.p. and operates on a 3-phase, 25-cycle, 440-volt circuit, its rated speed being 500 r.p.m.

### Electrical Engineers' Ball.

A meeting of the General Committee of the Electrical Engineers' Ball was held on May 13th at the Institution of Electrical Engineers. The hon. treasurer, Mr. J. E. Kingsbury, reported that the financial result of the 18th annual ball held on February 11th compared very favourably with the returns of previous years. The Committee decided to vote the sum of £150 to be divided equally between the Institution of Electrical Engineers' Benevolent Fund and the Electrical Trades Benevolent Institution. As on the two previous occasions, the number of tickets issued had to be strictly limited to the capacity of the accommodation, the number of guests present at the Ball being approximately 700.

### "Creeping" Cables.

In a short paper recently presented by Mr. F. E. Bentley to the Mersey and North Wales (Liverpool) Centre of the Institution of Electrical Engineers, he points out that the creeping of lead-covered telephone and telegraph cables along the underground multiple-way earthenware ducts and iron pipes into which they are drawn for protection has been the cause of damage to many cables. The movement varies over a length of several hundred yards; for instance, 18 in. in some parts and from 3 to 12 in. in others. It is arrested by right-angle bends in the duct track and by the lead-sleeve joints of the cable butting against the mouths of the ducts in manholes; the joints then become faulty owing to the strain imposed on the lead sheathing, which eventually cracks.

In some cases it is possible that the method of connecting loading coils to the cables is responsible for pronounced creep: the cable is divided into sections 1.6 miles in length, and it is probable that less movement would take place if the joints in the loading-coil manholes were straight-through, the sections of cable thus forming one long cable without breaks. Creep may take place both in and against the direction in which traffic normally passes along the road under which the cable is laid; one such case was apparently due to ground subsidence shortening the duct track, the surplus cable being thereby pushed into the manhole. Creeping of the paper-covered copper conductors inside the lead sheath is somewhat unusual; in one case the conductors moved bodily from ½ to ¾ in. into a joint in the lead sleeve, but no movement out of the other end of the joint could be detected, whilst the next joint (160 yards away) was normal and there was no evidence that the pipe or lead sheath had moved.

Covering the ducts with a layer of concrete is an expensive way of overcoming the trouble, but a less costly method is the following:—A lead disk and shoulder of metal are wiped on to the cable sheathing about 8 in. from the mouth of the duct in manholes, and a split hard-wood block is fitted round the cable between the disk and duct mouth, thus forming an anchoring device. A suggested method (not yet proved to be effective) of preventing the copper conductors creeping inside the lead sheath, is to carefully dress the sheathing down on to the conductors all round the cable on each side of the joints.

The following conclusions have been arrived at:—Most creeping appears to be directly due to vibration set up by heavy traffic over the road under which the cable is laid; movement takes place in the direction of the traffic and appears to be independent of gradient, sometimes taking place uphill. Creeping is more pronounced in earthenware ducts than in cast-iron pipes, the latter being more rigid. Less movement may be anticipated in a duct track that follows a winding road, and there is no remedy for that due to ground subsidence.

### The Photometric Department of the N.P.L.

On April 26th a visit was paid by members of the Illuminating Engineering Society and friends to the National Physical Laboratory. On arrival the party were received by the director, Sir Joseph Petavel, after which they were conducted by Mr. Walsh and his staff over the Photometric Section of the Laboratory. Much interest was taken in the equipment of the laboratories, the arrangements for testing standard lamps, the new 10-ft. diameter integrating sphere, &c. Visitors had also an opportunity of examining some of the special apparatus used for tests of radium paint, atmospheric absorption, the reflection of light by materials for road surfaces, &c.

After a short interval for refreshments a paper was read by Mr. J. Buckley, reviewing the work of the Photometry Department. Dealing with the methods of overcoming the difficulties of comparing lamps which differed in the colour of their light, he said that, unfortunately, it had not yet been found possible to apply gasfilled lamps as standards, though some progress in that direction had been made. Other refinements in photometry included the use of photo-electric cells, the ingenious application of which, to ensure lamps being operated at the same colour-temperature, was particularly interesting. The routine of lamp-testing was described, and the author referred to a number of special investigations, such as the design of picture galleries to secure adequate daylight illumination of the walls and avoidance of reflections in the glass of pictures; the study of ships' navigation lights for the Board of Trade; and the search for a satisfactory primary standard of light.

### Electrical Association for Women.

On May 11th the annual business meeting of the Association was held at the Hotel Cecil, London. The annual report was proposed by Lady Brooks, O.B.E., J.P., president of the Birmingham and Midlands Branch, and seconded by Mr. J. W. Beauchamp, both of whom referred to the wonderful progress made by the Association. Short reports of local activities were given by Miss R. F. Kennedy, hon. secretary of the Glasgow and District Branch; Mrs. A. L. Hayes, hon. secretary of the Birmingham and Midlands Branch; Miss Entwisle, hon. secretary of the Manchester and District Branch; Miss A. A. Stemp, hon. secretary of the Cheltenham Branch; Mrs. J. Tyler, hon. secretary of the South Wales and Monmouth Branch; and Miss Anna Holm, hon. secretary of the North-East Coast Branch.

The annual report stated that the past year had been one of great development and afforded overwhelming justification for the existence of the Association. Its growth had been phenomenal. The branches at Glasgow, Birmingham, and Manchester had added very considerably to their membership, and three new branches had been formed at Cheltenham, Cardiff, and Newcastle. Many lectures had been given and visits paid to electrical shops and factories; requests from various other organisations for lectures on "Electricity in the Home" and similar subjects, had also been complied with, and a liaison had been established with the Association of Teachers of Domestic Science.

In order to cope with the needs of women working in electrical shops and showrooms, a series of evening lectures was held during the winter months, with the co-operation of Mr. Beauchamp, of E.D.A., and Mr. Bush, of E.L.M.A., and a committee was formed to endeavour to evolve a scheme which would help the woman in the electrical industry to become more efficient and useful in her work. With a view primarily to training suitable girls for work in connection with the domestic developments of electricity, a syllabus had been drawn up which had been approved by the Headmistresses' Committee, and which was being introduced into the Chelsea and Battersea Polytechnics.

The Association's journal, *The Electrical Age for Women*, already had a large circulation. Evidence of interest in the work of the Association had reached it from America, Canada, South Africa, Japan, Germany, and Austria, and requests had come from Sweden and Southern Ireland for help in forming similar associations.

Alderman Mrs. Hammer had continued to act as chairman of the Council and the Executive and Finance Committees, and her great knowledge had been invaluable to the Association. Thanks were accorded to Mr. Cramb, of the I.M.E.A., and Miss Lanfear, for the very great assistance which they had given in arranging special meetings of interest to women at their annual Convention.

After the luncheon, reported on p. 814, over 150 members visited Magnet House, by kind permission of the General Electric Company, when a lecture was given by Dr. Porter, medical officer of health for St. Marylebone, on "Public Health Regulations," with special reference to the preservation of food. Mr. W. H. Roberts and Mr. Creasser, of the G.E.C., explained the principles of refrigeration. The members were entertained to tea by the company, and afterwards visited the Electric Bungalow.

On Thursday morning, at the invitation of Mr. H. H. Berry, the members visited Touchbutton House, Newman Street, where they were shown a replica of the new electric grate to be installed in the Piccadilly home of the Duchess of York. The members were also interested in the many beautiful examples of Mr. Berry's art in retaining the charms of antiquity and adding to them the modern comforts of electricity. Mr. Berry's hospitality was very much appreciated.

In the afternoon the members visited the Woolwich works of Standard Telephones & Cables, Ltd., where they were received by Mr. Martin, the works manager, Mr. Eve, and Mr. Goodburn. They were conducted through the works and saw the various processes in the manufacture of telephone cables and large electric cables. Much interest was shown in the 450,000-V testing plant recently installed. Afterwards the members visited the Eltham housing estate of the Woolwich Borough Council, where they were met by Mr. Keats, borough electrical engineer, and a representative of the Housing Committee, and inspected several of the "all-electric" homes. On a Sunday morning the maximum load for cooking purposes alone on this estate amounts to 1,400 kW, and last Sunday the domestic load was greater than the evening lighting peak load for the whole of the 30 years' history of the undertaking.

### The Eclipse of the Sun.

A lantern lecture on the total eclipse of the sun on June 29th (the first visible in England for 200 years) will be given by the President of the Royal Astronomical Society (Rev. T. E. R. Phillips), on Friday, May 27th, at 8 p.m., at the Polytechnic, Regent Street, in aid of King Edward's Hospital Fund for London. The price of admission is 1s. 6d.; seats numbered and reserved, 4s.

### An Electro-Medical Department at Glasgow.

An electro-medical department is being introduced at Stobhill Hospital by the Parish Council, at a cost of £20,427. The department will embrace the latest developments for the treatment of diseases by means of electricity.

### The Paris E.h.p. Electrical Conference.

Good progress is being made with the preliminary arrangements for this meeting, which is to be held at the end of June. The present indications are that over 200 foreign representatives will be present from 23 countries, and 65 papers are to be discussed. The English members at present number just over 20; however, as was the case last year, it is probable that the numbers will be considerably augmented (over 40 were present last year). Applications should be made to the secretary of the Institution of Electrical Engineers, London. The British official delegates are Messrs. W. B. Woodhouse (chief delegate), J. R. Beard, P. V. Hunter, R. Borlase Matthews, and C. Rogers.

### Cause and Effect.

I am told of a lady whose illness was diagnosed by her doctor as acute gastritis. She at once declared that she knew the cause of the trouble. She had lately had her meals cooked on a gas range, instead of on the coal one to which she had always been used!—Peter Simple, in the *Morning Post*.

# Institution Notes.

### Institution of Civil Engineers.

At the annual general meeting, held on May 10th, the result of the ballot for the election of officers was declared. The president-elect is Mr. E. F. C. Trench, C.B.E., M.A., B.A.I. Amongst the vice-presidents are Sir Archibald Denny, Bart., Sir John F. C. Snell, G.B.E., and Mr. G. W. Humphreys, C.B.E.

### Royal Institution.

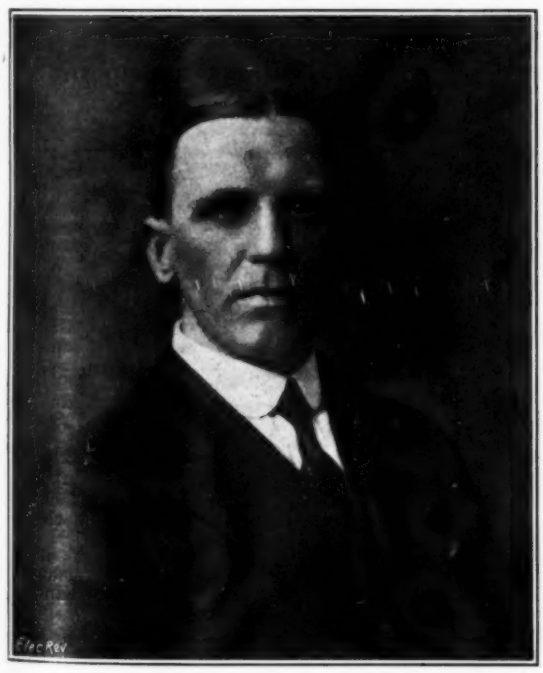
A general meeting of the members was held on May 9th. Sir J. J. Thomson was elected Honorary Professor of Natural Philosophy, and Sir Ernest Rutherford Professor of Natural Philosophy. The chairman announced that the president, the Duke of Northumberland, had nominated, amongst others, Sir Dugald Clerk and Sir Charles Parsons as vice-presidents for the ensuing year. Mr. P. V. Hunter, Dr. Samuel Insull, and Mr. Charles P. Sparks were amongst the members elected.

# Our Personal Column.

**Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements**

Messrs. COUZENS & BROWN, consulting engineers, announce that, consequent upon the death of Captain REGINALD J. WALLIS-JONES, who was the sole surviving partner of the firm of Wallis-Jones & Dent, consulting engineers, they have taken over the business of the firm, and all work and correspondence will be attended to by them at 9, Old Queen Street, S.W.1.

Mr. JOHNSTONE WRIGHT, who is leaving Belfast to join the staff of the Central Electricity Board, and whose portrait accompanies these notes, was educated at the Perth Academy and the Glasgow Technical College. He entered business by joining Messrs. Duncan Stewart & Co., Glasgow, and received an all-round practical training. He then went to the British Electric Plant Co., Alloa, where he took charge of the power plant supplying the works and town. Later he went over to the works testing department and was subsequently in charge of outside contracts. One of his principal jobs was the electrification of the Moss End steelworks of Messrs.



*Abernethy* [*Belfast.*

**Mr. Johnstone Wright, M.I.E.E., M.I.Mech.E.**

Stewarts & Lloyds, including power station and works equipment. Leaving Alloa, he became chief assistant engineer at Oban, and in December, 1906, he joined the staff of the Cleveland and Durham Electric Power, Ltd. He spent 13 years altogether with the North-East Coast Power Companies, first as clerk of works and then as constructional and mechanical engineer during the development of the waste heat power stations in the 800 sq. mile area of the Cleveland Co. Later Mr. Wright was appointed engineer and superintendent of the nine stations of the Cleveland and Associated Companies. He entered municipal service in 1919 as chief assistant engineer to the Bradford Corporation, and a year later became deputy city electrical engineer. In 1922 he went to Belfast as city electrical engineer and general manager, and did excellent work. During his tenure the sales of energy rose from 29 to 45 million kWh, and the net profit from £32,766 to £62,402, while the cost of production fell from 2.12d. to 0.769d. per kWh, and the average price obtained from 3.00d. to 1.89d. per kWh. He prepared a complete scheme for electricity generation and transmission throughout Ulster for presentation to the Commission on the Natural and Industrial Resources of Northern Ireland, in 1925. Last year, on behalf of the Belfast Corporation, Mr. Wright made a tour of the United States and Canada to study electricity supply development.

The marriage took place at Shanklin, on April 30th, of Mr. C. U. S. BUXENSTEIN, electrical engineer with the Isle of Wight Electric Light Co., and Miss ELSIE WHITE, daughter of Mr. G. White, of Shanklin. The presents included an 8-day clock from the staff at the Sandown and Shanklin generating station.

The Accrington Town Council has by 15 votes to 7 passed a resolution to the effect that the electrical engineer shall receive his full salary and bonus under the scale, and that the remuneration be further increased until the total sum is £991, according to the number of units consumed.

MR. F. H. BLAXLEY has joined the Electrical Trades Supply, Ltd., Great Charles Street, Birmingham, as Midland representative.

MR. C. PAIGE DICKINS, welfare supervisor at the Sentinel Wagon Works, Shrewsbury, has been appointed sales manager in Liverpool for the Stella Electric Lamp Co. He was the recipient of a number of presents from the Sentinel Works Sports Club, &c., Shrewsbury, on May 6th.

The Hastings Corporation Electricity Committee has received the resignation of Mr. RUSSELL F. FERGUSON, the borough electrical engineer, owing to the state of his health. The committee recommends that Mr. Ferguson be superannuated on September 30th next, and that in view of his long and faithful service extending over a period of 25 years, his special services in connection with works undertaken by him without engagement of a consulting engineer, and of the rapid development of the undertaking, he be granted the sum of £750. The committee recommends that Mr. ALFRED JAMES RYAN, who has held the position of deputy borough electrical engineer since November, 1922, and, for a period of nine years prior to that date, the position of chief assistant electrical engineer, be appointed to the post of borough electrical engineer at £850 per annum, rising to £1,000 per annum.

Mr. W. SINGER has been appointed transformer sales manager and engineer to Messrs. G. Dikkers & Co. (England), Ltd.

Mr. J. W. MASON, manager of the electrical department of Messrs. John Bell & Croyden, Ltd., has been appointed lecturer to the London Clinic, Ranelagh Road, Victoria, in connection with the training of nurses and post-graduate courses for the medical profession.

Mr. EDWIN T. POUND, charge engineer under Glasgow Corporation at Port Dundas power station, has been appointed resident electrical engineer by North Berwick Town Council for the burgh electric lighting works, the Council having recently acquired the local electric light and power undertaking.

Mr. L. ROMERO, who has been in the service of the Salford Corporation Electricity Committee for the past twenty years, latterly as mains engineer, has been appointed to succeed Mr. S. J. Watson as chief electrical engineer. He will take up his new duties on July 1st at a salary of £1,000 per annum, rising to £1,250. It will be remembered that Mr. Watson is taking the post of chief electrical engineer to the London and Home Counties Joint Electricity Authority. Mr. Romero is 44 years of age.

The marriage took place on April 8th at Ahmedmagar, India, of Mr. GEOFFREY EDWARD MARTIN, A.M.I.E.E., of the B.B. and C.I. Railway, and Miss CONSTANCE HEWITT, youngest daughter of Rev. George Hewitt, of Ahmedmagar.

**Obituary.**—MR. G. F. BURNHAM.—The death is announced from Rye of Mr. George Frederick Burnham, who was for many years on the staff of the Eastern Telegraph Co. abroad.

MR. F. NEWMAN.—We regret to record the death, which occurred on May 11th, at Ruislip, of Mr. Frank Newman, director of the Alliance Electrical Co., Ltd., and late of Drake and Gorham, Ltd.

MR. A. ROTHWELL.—The death occurred at Fern Leigh, Great Harwood, on May 11th, of Mr. Albert Rothwell, aged 30, electrician, a war victim who never fully recovered from an operation following active service. He was one of four sons of Mr. W. Rothwell, electrical engineer, Great Harwood.

MR. K. QUANEY.—The death took place on May 9th of Mr. Kyran Quaney, overhead and cable engineer of the Dublin Tramways Company. He was one of the first engineers appointed when the system was electrified.

MR. J. M. HARLOW.—The death took place on May 10th, at the age of 60 years, of Mr. John Marklow Harlow, founder of the business of J. N. Harlow & Co., electricians, &c., of Burton-on-Trent.

**Will.**—The late Lieut.-Col. P. W. D'ALTON left £8,233.

# Financial Section.

**New Companies, Returns of Share Capital, Debenture Changes, Reports of Electrical Companies, Dividend Results, Transactions in Stocks and Shares.**

## New Companies Registered.

**Luminad, Ltd.**—Private company. Registered May 10th. Capital, £100 in 1s. shares. Objects: To acquire a licence from F. W. Gillard and D. L. West, and to carry on the business of designers, inventors, and manufacturers of and dealers in all kinds of illuminated, mechanical, revolving, swing, fixed, and other signs, and apparatus and processes for internal and external lighting, &c. The first directors are:—F. W. Gillard, 86, Wolfington Road, West Norwood, S.E.27, chartered civil engineer; D. L. West, The Golf House, Mitcham Road, Tooting Junction, S.W., electrical engineer (director of Grant and West, Ltd.); S. M. Stone, M.R.C.S., 86, Harley Street, W.1. T. R. Treloar signs as director and secretary. The first three named are permanent. Solicitors: F. B. Brook, 6 and 7, South Square, Gray's Inn, W.C. Registered office: Bridewell House, Bride Lane, E.C.4.

**Electrical Units, Ltd.**—Private company. Registered May 5th. Capital, £1,000 in £1 shares (250 7½ per cent. cumulative preference and 750 ordinary). Objects:—To adopt an agreement with H. T. Hall, J. Glanville, and J. F. Rose-Innes, and to carry on the business of manufacturers of wireless component parts and accessories, general and electrical engineers and contractors, tool makers, garage proprietors, &c. The first directors are:—H. T. Hall, 105, Valetta Road, Acton, W., electrical engineer; J. Glanville, 83, Studdridge Street, Fulham, S.W., electrical engineer; J. F. Rose-Innes, 12, Greville Road, N.W., electrical engineer; F. E. Spinner, 83, Studdridge Street, Fulham, S.W., mechanical engineer. Qualification, 25 shares. Secretary: J. F. Rose-Innes. Solicitor: H. W. Stirling, 23, Surrey Street, W.C.2. Registered office: 104, North Street, Edgware Road, N.W.8.

**J. Holbrook and Tattersall, Ltd.**—Private company. Registered May 13th. Capital, £2,000 in £1 shares. Objects: To acquire the business of an electrical engineer and contractor carried on by J. R. Holbrook as "J. Holbrook & Co.," together with the offices and lease and goodwill thereof at 6, Cheapside, E.C. The life directors are:—J. R. Holbrook, 35, Dalmally Road, Croydon, electrical engineer; J. Tattersall, Sorrento, Church Lane, Sutton-on-Sea, Lincs., gentleman (chairman); G. Langdale, The High Holme, Louth, Lincs. Secretary: J. Tattersall. Solicitors: Curwen Carter & Evans, 1, Grays Inn Square, W.C.1. Registered office: 6, Cheapside, E.C.

**Finnell System, Ltd.**—Private company. Registered May 13th. Capital, £3,000 in £1 shares. Objects: To act as sole agents, distributors, importers, exporters, manufacturers and dealers in the British Isles of and in electric cleaning machines, known as the "Finnell Electric Cleaner," manufactured and produced by the "Finnell Company of the U.S.A." The first directors are:—R. W. M. Wright, 10, Beach Lawn, Waterloo, Liverpool, agent and importer; L. Buck, 9, Belvedere Road, Great Crosby, Liverpool; J. P. Buck, 13, Marlborough Gardens, Carlisle; and R. W. C. Wright, 10, Beach Lawn, Waterloo, Liverpool (all permanent). Qualification: £100. Registered office: 33, Moorfields, Liverpool.

**L. E. Wilson & Co., Ltd.**—Private company. Registered May 11th. Capital, £2,000 in £1 shares. Objects: To carry on the business of contractors and suppliers of electricity, electrical, mechanical, and consulting engineers, manufacturers of and dealers in electrical, magnetic, telephonic, telegraphic, and other appliances and apparatus, &c. The first directors are:—L. E. Wilson, 62a, Mosley Street, Manchester, electrical engineer; Mrs. E. L. Wilson, "Ingleton," Bentinck Road, Altrincham; L. Fraser, 43, Radnor Drive, Wallasey, solicitor. The first two named are permanent. Qualification: £1 share. Solicitors: Doughty & Fraser, 43, Radnor Drive, Wallasey. Registered office: 62a, Mosley Street, Manchester.

**Electric Bulk, Ltd.**—Private company. Registered May 6th. Capital, £100 in 1s. shares. Objects:—To carry on the business of a financial, commercial, electrical, manufacturing, contracting, promoting, mercantile, and developing association, especially electrical matters, &c. The permanent directors are:—J. A. Rogers, 44, Oxford Terrace, W.2; E. J. Woods, 131, Wigmore Street, W.1. Registered office: 12, Mansion House Chambers, 11, Queen Victoria Street, E.C.4.

**Liverpool Engineering and Condenser Co., Ltd.**—Private company. Registered May 12th. Capital, £20,000 in £1 shares. Objects: To acquire the business of engineers and condenser manufacturers now or recently carried on as "The Liverpool Engineering and Condenser Co., Ltd.," at Perry Street, Liverpool. The first directors are:—H. B. Potter, Lee Cottage, Shawclough, Rochdale; J. E. Tweedale, Barcroft, Marland, Rochdale; W. Kayley, Chancery Lane, Ardwick, Manchester; R. Barnes, The Hollies, Milnrow, near Rochdale; J. W. White, Britain Road, Widnes; D. A. Quiggin, "Freshfield," Liverpool. Qualification: 10 shares. Solicitor: J. A. Hudson, 32, Lord Street, Rochdale.

**Cleethorpes Radio Supply, Ltd.**—Private company. Registered May 6th. Capital, £1,000 in £1 shares. Objects:—To acquire the business of electrical engineers, &c., heretofore carried on as the "Cleethorpes Radio Supply" at Cleethorpes, Lincs., and elsewhere. The first directors are:—E. Turner, "Birchwood," Clee Road, Cleethorpes; J. Popplelton, 79, Fuller Street, Cleethorpes; H. M. Stannard, "The Ramblers," Old Clee, Grimsby; Mrs. L. Turner, "Birchwood," Clee Road, Cleethorpes. Qualification, 1 share. Secretary: E. Turner. Solicitor: H. A. Howden, Prudential Chambers, Victoria Street, Great Grimsby. Registered office: 11, Short Street, Cleethorpes.

**Carrington & Button, Ltd.**—Private company. Registered May 13th. Capital, £6,000 in £1 shares. Objects: To acquire the business of an electrical and mechanical engineer, heretofore carried on by C. E. C. Button, at 144, High Street, Crewe, Cheshire. The first directors are:—C. E. C. Button, Lyndhurst, Wistaston, Nantwich; C. E. Gresty, Redmayes, Wistaston, Nantwich. C. E. C. Button is permanent managing director, so long as he holds 1,000 shares. Qualification of directors, 50 shares. Secretary: L. J. Button. Solicitors: Speakman & Hill, 35, Market Street, Crewe. Registered Office: 44, High Street, Crewe.

**W. H. Porter & Co., Ltd.**—Private company. Registered May 6th. Capital, £100 in £1 shares. Objects:—To carry on the business of manufacturers of, and dealers in wireless, telegraph and telephone instruments, equipment and material, sports outfitters, &c. The subscribers (each with 1 share) are:—C. H. Rosenthal, 12, Rotton Park Road, Edgbaston, merchant; J. Harris, 30, Wheeleys Road, Edgbaston, merchant. C. H. Rosenthal signs as managing director. Qualification, 10 shares. Solicitors: Joseph Cohen & Cowen, 14, New Street, Birmingham. Registered office: 44, Church Street, Birmingham.

**Wilrose Co. (Birmingham), Ltd.**—Private company. Registered May 6th. Capital, £100 in £1 shares. Objects:—To carry on the business of manufacturers of, and dealers in wireless, telegraph and telephone instruments, equipment and material, sports outfitters, &c. The subscribers (each with 1 share) are:—C. H. Rosenthal, 12, Rotton Park Road, Edgbaston, Birmingham, merchant; J. Harris, 30, Wheeleys Road, Edgbaston, Birmingham, merchant. J. Harris signs as managing director. Solicitors: Joseph Cohen & Cowen, 14, New Street, Birmingham. Registered office: 39, William Street, Ladywood, Birmingham.

**M. Woolldridge (Wireless), Ltd.**—Private company. Registered May 9th. Capital, £1,500 in £1 shares. Objects:—To acquire the business of a wireless apparatus and material manufacturer and dealer, and dealer in electrical goods now carried on by Mabel Woolldridge at 26 and 39, Lisle Street, W., as "M. Woolldridge." The permanent directors are:—Mrs. M. Woolldridge, 26, Lisle Street, Leicester Square, W.C.2.; P. Parry, 48, Leigh Road, Highbury, N.5. Registered office: 26, Lisle Street, Leicester Square, W.C.2.

**Electrical Manufacturing and Plating Co., Ltd.**—Private company. Registered May 12th. Capital, £300 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in electrical apparatus and machinery, electrical engineers, and plating experts, &c. The first directors are:—L. French, "Frogholt," Norbiton Avenue, Kingston-on-Thames; E. French, "Glenhaven," 84, Park Road, Kingston Hill, Surrey. Solicitors: Kenneth Brown, Baker, Baker, Lennox House, Norfolk Street, Strand, W.C.2.

**Bryterlite Electrical Co.**—Private company. Registered in Edinburgh, May 10th. Capital, £1,000 in £1 shares. Objects: To carry on the business of manufacturers, agents, commission agents, and dealers in all kinds of electric lamps, globes, shades, wireless valves, &c. The first directors are:—B. Wober, 21, Nicholson Street, Glasgow, commission agent; G. Hope, 52, Carrington Street, Glasgow, clerk. Qualification: £10 shares.

**Electrical Agencies (London), Ltd.**—Private company. Registered May 10th. Capital, £1,000 in £1 shares. Objects: To carry on the business of agents, factors, and merchants for electrical fittings and appliances of all kinds, &c. The subscribers (each with one share) are:—G. Boggis, 7, Hornsey Lane Gardens, Highgate, N.6, clerk; Jessie M. Thorpe, 126, Salusbury Road, N.W.6, clerk; S. Gevirtzf signs documents as managing director. Solicitors: Landman & Foy, 23-3, Laurence Pountney Lane, E.C.4.

# Official Returns of Electrical Companies.

**Peter Curtis, Ltd.**—Capital, £25,500 in 13,000 7 per cent. cumulative preference and 11,500 7 per cent. preferred ordinary shares of £1 each and 20,000 deferred shares of 1s. each. Return dated March 28th, 1927. 11,455 preference, 11,500 preferred ordinary, and 20,000 deferred shares taken up. £3,000 paid on 2,000 preference and 1,000 preferred ordinary shares. £20,955 considered as paid on 9,455 preference, 10,500 preferred ordinary, and 20,000 deferred shares. Mortgages and charges, £2,000.

**Clear Hooters, Ltd.**—"A" debenture dated April 21st, 1927, to secure £500, charged on the company's undertaking and property, present and future, including uncalled capital. Holders:—Barclay's Bank, Ltd. Also "B" debenture of same date to secure £500, charged on the above property. Holder:—L. J. F. Austin, Lichfield Chambers, Upper Priory, Birmingham. (The company may not create any mortgage, charge or lien in priority to or *pari passu* with the above charges.)

**Pulford Brothers, Ltd.**—Mortgage and charge on leasehold hereditament Nos. 102 and 104, Whitechapel, Liverpool, with machinery and fixtures, and the company's undertaking and property, present and future, including uncalled capital, dated April 13th, 1927, to secure all moneys due or to become due from the company to the Midland Bank, Ltd.

**County of London Electric Supply Co., Ltd.**—Satisfaction in full on April 29th, 1927, (1) of debenture stock secured by indentures dated January 23rd, 1899, and July 5th, 1909, securing £500,000, and (2) of debenture stock secured by indentures dated May 12th, 1903, October 13th, 1904, and July 5th, 1909, securing £500,000.

**Wallingford and District Electric Supply Co., Ltd.**—Capital, £13,000 in £1 shares. Return dated May 20th, 1926. 12,213 shares taken up. £12,213 paid. Mortgages and charges, £3,500. Return of alloments, made up to February 8th, 1927, shows a further 787 shares allotted for cash.

**Korting Brothers (1917), Ltd.**—Debenture dated April 27th, 1927, to secure £1,000, charged on the company's undertaking and property, present and future, including uncalled capital. Holder:—F. A. Robinson, "Sunnybank," Lucknow Avenue, Nottingham.

**Eddystone Components, Ltd.**—Capital, £1,000 in £1 shares. Return dated January 28th, 1926 (filed March 11th, 1927). 182 shares taken up. £10 paid. £172 considered as paid. Mortgages and charges at date of return, £500. Since registered: Debenture dated April 23rd, 1926, to secure £500.

**Sheffield Wireless Depôt (1926), Ltd.**—Capital, £500 in £1 shares. Return of allotments, made up to February 4th, 1927, shows 4 shares allotted for cash and 496 shares allotted as fully paid pursuant to purchase agreement. Mortgages and charges, nil.

**Radiolicity, Ltd.**—Capital, £1,000 in 950 preference shares of £1 each and 1,000 ordinary shares of 1s. each. Return dated December 31st, 1926. 500 preference and 500 ordinary shares taken up. £525 paid. Mortgages and charges, nil.

**J. H. Runbaken, Ltd.**—S. Barlow, of 14, John Dalton Street, Manchester, was appointed receiver and manager on April 19th, 1927, under powers contained in debenture dated November 8th, 1926.

**Vee Cee Dry Cell Co., Ltd.**—H. M. West, C.A., of 1, Station Road, Reading, was appointed receiver and manager on May 2nd, 1927, under powers contained in debenture dated November 10th, 1926.

**Electron Co., Ltd.**—Satisfaction to the extent of £500, £200, and £500 respectively, on April 4th, 1927, of debentures dated September 22nd, 1925, and February 2nd and 19th, 1926, securing the respective sums of £600, £1,400, and £1,500.

**H. T. C. Electrical Co., Ltd.**—Capital, £2,500 in £1 shares. Return dated January 3rd, 1927. All shares taken up. £950 paid. £1,550 considered as paid. Mortgages and charges, nil.

**Whitfield Electrical Co., Ltd.**—Capital, £500 in £1 shares. Return dated December 17th, 1926 (filed April 9th, 1927). 401 shares taken up. £401 paid. Mortgages and charges, £2,000.

**L. P. S. Electrical Co., Ltd.**—Capital, £5,000 in £1 shares. Return dated December 31st, 1926 (filed March 22nd, 1927). All shares taken up. £5,000 paid. Mortgages and charges, nil.

**Crossby (Liverpool), Ltd.**—Particulars filed of £500 debentures authorised April 14th, 1927, charged on the company's property, present and future, including uncalled capital, the whole amount being now issued.

**Anderton Brothers, Ltd.**—D. B. Sandeman, of 194, Union Road, Oswaldtwistle, ceased to act as receiver or manager on May 4th, 1927.

**M. S. L., Ltd.**—Capital, £500 in £1 shares. Return dated March 15th, 1927. All shares taken up. £500 paid. Mortgages and charges, nil.

# City Notes.

### British Thomson-Houston Co., Ltd.

The report for 1926 records the deaths of Messrs. C. A. Coffin and A. W. Burchard, directors of the company. The profit for the year was £355,385 (against £467,200), and to this is added £220,126 brought forward, making £575,511. After deducting debenture interest, depreciation, and preference dividends, there remains a balance of £226,468 which it is proposed to carry forward. The directors regret their inability to recommend a dividend on the ordinary shares. (The ordinary dividend for 1925 was 6 per cent.) The prolonged coal dispute and the general industrial conditions resulting therefrom had a direct effect upon the company's output which was substantially less than had been estimated. An amount of £1,150,000 in the balance sheet under the head of "loans" comprises advances from one of the company's associated interests for the purpose of completing works under construction and the financing of the extensions of the company's activities. The meeting is to be held on May 24th.

### Urban Electric Supply Co., Ltd.

The annual meeting was held on May 12th, Mr. P. D. Tuckett presiding. In moving the adoption of the report (ELEC. REV., May 6th, p. 731), the chairman said that a year ago there was every prospect of a continuance of steady progress. Then, however, the coal strike occurred, and was accompanied by lighting restrictions and business dislocation, and their income was reduced by £1,200 and their profit from contracting work by £720. They incurred an increase of nearly £20,000 in the cost of coal. They endeavoured to recover some part of the cost by raising their rates of charge in the December quarter, but it was only to a limited extent that they were able to protect themselves in that way, since they were already charging their maximum rates in some of their undertakings, whilst in a number of others they had reduced their lighting rates at the beginning of the year by arrangement with the local authorities and were thus precluded from varying them. The increased output of 1,750,000 kWh was little more than half the previous year's increase, and was insufficient to compensate for the heavy increase in the cost of coal, &c. Moreover, nearly 80 per cent. of the increased output represented power and was mainly accounted for by the Twickenham and Cornwall Electric Power Companies, neither of which paid increased dividends. Their tramways at Glossop and Redruth were seriously affected by the strike as well as by increasing motor-'bus competition. They carried over half a million fewer passengers, a reduction of 23 per cent. as compared with 1925, and showed an actual working loss of £1,764. Those tramways had now been in existence for upwards of 20 years, and if they were to continue to operate, the renewal of the rails and a general overhaul of the rolling stock could not be postponed much longer, so that the alternative of their abandonment was now engaging their serious attention. The Walton Urban District Council had recently exercised its right of purchase of their Walton undertaking, hitherto worked in conjunction with their Weybridge undertaking, and it was to be taken over as from July 1st. The purchase price had been agreed at £89,000, which returned them their capital expenditure in full. They regretted parting with the undertaking, however, since they would be deprived of the profits which it had hitherto contributed to their income, besides being hampered to some extent in the independent working of their Weybridge undertaking. It was possible that a similar situation might arise in connection with the Weybridge undertaking, for the Weybridge Council, recognising the advantages attaching to the continued joint working of the two undertakings at the present time, was considering the question of purchase in the event of its being able to arrange a joint working agreement with the Walton Council. Last year, to meet the growing load of the Cornwall Electric Power Company, the whole of whose share capital of £180,000 was held by them, they found it necessary to order a steam turbine of 7,500-kW capacity together with boilers, switchgear, and other accessories. When installed, this new plant would nearly double the capacity of the generating station and would greatly add to the efficiency of its working. Despite the effects of the coal strike, from which it suffered in common with other industrial undertakings, the Cornwall Company earned an increased profit last year and had every prospect of earning increased profits this year, and, he hoped, for many years to come, since the tin mines, to which the bulk of its output was sold and on whose prosperity its success so largely depended, were being actively developed. It would no doubt have been possible, by reducing the carry forward, to recommend some small increase in the ordinary dividend, but after consideration they came to the conclusion that it would be unwise prematurely to make an increased distribution on this occasion out of profits which had not been earned during the past year, in anticipation of improved results which might not be realised during the coming year. As to the future, in spite of the adverse conditions last year they connected an additional 1,832 kW of load, and there was every prospect of a steady expansion of the business. The report was adopted.

### Notting Hill Electric Lighting Co., Ltd.

This company's report for 1926 was reviewed in our issue of May 6th (p. 729). The annual meeting was held on May 10th, when Mr. A. E. Franklin (chairman), in a statement read by the deputy chairman (Mr. L. Jacob), explained the arrangements which had been made for the extension of the company's tenure, and dealt in some detail with the reorganisation of the capital and revenue accounts. He said that the basic charge to consumers had not yet been fixed, but it was considered that the figure would be very close to their present charge. The Wood Lane station was now leased to the London Power Co. at 6 per cent. interest on its valuation (£251,908), but that figure excluded the valuation of the sinking fund investments held by the trustees for the debenture holders. The London Power Co. had to pay them funds to redeem their 4 per cent. debentures on the joint station (up to the amount of the valuation). The securities represented by the sinking fund would supply the balance, and the unused portion of those securities would constitute the surplus, which after clearing debts, would be divided between the two companies. They hoped that their share would raise their distribution to about the equivalent of £4 per share. Referring to the general strike, the chairman said that the loyalty of their technical staff made it possible to maintain the supply; and by the foresight of the chief engineer, the Wood Lane station was able to carry on with its stocks of coal for six months. The directors proposed to consolidate the two classes of preference shares and make them all cumulative; to ask for powers to issue the unissued £56,000 of preference shares in such manner as they thought fit; and to capitalise the free reserves. The reports and accounts were adopted, and subsequently the rearrangement of the capital was approved.

### Great Northern Telegraph Co., Ltd., of Denmark.

The directors' report for 1926 states that owing to the closing of the Harbin station, the lines between Leningrad, Irkutsk, and Vladivostok, had to carry the whole of the company's Far East traffic during the latter part of the year. Negotiations with the Russian Administration for the exclusive use of another wire between Irkutsk and Vladivostok have not yet reached a settlement. The company's activities in Russia, in so far as the transmission of Russian terminal telegrams exchanged with Western Europe and America is concerned, are not remunerative owing to salary increases, loss of traffic, &c. In spite of the unsettled conditions in China, the traffic exchanged with that country has not decreased; there is even a slight improvement in the Far East traffic. No result has been arrived at in the negotiations between the Chinese Telegraph Administration, the Eastern Extension Co., and the Great Northern Co. The company's offices at Mariehamn and Stockholm have been closed. The coal dispute caused a decline in British traffic and that of most other European countries shows a decrease. Although there is now radio competition in the Far East traffic, the company feels confident of the superiority of its service. There was a fall of £220,000 in the year's revenue and one of £240,000 in the expenditure. As previously reported, the directors propose to pay 30s. per £10 share less tax, making a total dividend and bonus of 20 per cent. for the year.

### Siemens Bros. & Co., Ltd.

The directors' report for 1926 states that notwithstanding the grave industrial conditions prevailing during the greater part of the year, the company's profits showed no diminution as compared with 1925, but the hope of expansion from enlarged manufacturing facilities was not realised. The cost of production was increased by the high price of fuel. Nevertheless, the value of orders in hand from 1925 enabled the company to attain a better output than would otherwise have been possible. Many important contracts were carried out, the most notable being the manufacture and laying for the Pacific Cable Board of a loaded submarine telegraph cable from Fanning Island to Suva, Fiji, a distance of 2,143 nautical miles. This cable is giving excellent service at a very much higher speed of transmission than that which was guaranteed. The accounts show a profit of £358,990 (an increase of £2,109). The final ordinary dividend is 5 per cent., making 7½ per cent. for the year. There remains a balance of £70,364, to which is added the amount brought forward, less £100,000 paid on account of excess profits duty, of £196,400, making a total of £266,504. In view of the unsettled trade conditions and the outstanding liability to excess profits duty it is proposed to carry forward the whole of this balance. Meeting: May 23rd.

### Barcelona Traction, Light and Power Co., Ltd.

The annual meeting was held at Toronto on May 10th. Mr. M. Lash presided and said that the results for the past year showed a considerable improvement, and that still further progress had been made during the first quarter of the current year. In addition, the exchange had improved from 33.71 in 1925 to 28.70 in the first four months of this year. There were many circumstances tending to aid the company, including the funding of the Spanish debt, the freedom of the country from labour troubles, the electrification of railways, and telephone development. The company had made arrangements to convert its 7 per cent. 30-year peseta bonds into 6 per cent. 45-year bonds, and it had been decided to pay an interim dividend of 1 per cent. on the common shares. The directors intended to review the position every six months to determine what dividends could be paid.

### Brush Electrical Engineering Co., Ltd.

The report for 1926 states that the co-partnership scheme has been put into operation and provision for it has been made in the accounts. The surplus profit for the past year (£8,751) has been credited to the shareholders and "co-partners"; the co-partners' share amounting to £7,301 has been distributed. The accounts for 1926 show that after providing for general charges, depreciation, debenture interest, &c., there is a net profit of £62,887. Of this £5,495 is transferred to general reserve; interest on prior lien debenture stock absorbs £2,044; a dividend of 10 per cent. is declared (including the co-partnership shares); and a balance of £8,835 remains for apportionment between the shareholders and co-partners. The co-partners' share amounts to £7,354. The general reserve has been increased to £239,359 by the addition of certain amounts. During the year £7,853 was spent on capital account. The year's operations were adversely affected by the general strike and coal dispute, but nevertheless important contracts for turbo-electric plant, &c., as well as rolling stock, were carried out. While competition remains severe both in the home and foreign markets, the amount of business in hand and in prospect justifies the expectation of a reasonably busy year. A statement issued with the report shows that the trading profit was £135,464, as compared with £145,491. The undivided profits account stands at £79,122. Meeting: May 23rd.

### Lancashire Electric Light and Power Co., Ltd.

The trading profit of the Parliamentary Company (the Lancashire Electric Power Co.) for 1926, plus interest receivable, was £199,937, and after adding the amount brought forward and providing for depreciation and reserves, a balance of £131,431 is paid to the Electric Light and Power Co. With the addition of other items, there is a total of £142,798. The profit balance for the year is £133,904, to which is added £9,826 brought forward, making £143,730. A final dividend, making 7½ per cent. for the year, is to be paid on the 7 per cent. cumulative participating preference shares, and the ordinary dividend is also 7½ per cent. A balance of £5,933 is carried forward. The general strike affected the company's output, but the supply was maintained. The new Padiham station was completed during 1926 and placed in regular operation in January last. The Parliamentary Company's returns show that the energy generated or purchased rose from 151,495,964 kWh in 1925 to 168,244,521 in 1926, while the maximum load rose from 70,200 to 80,450 h.p. and the connected load from 89,200 to 100,500 h.p. Meeting: May 23rd.

### Sevenoaks and District Electricity Co., Ltd.

Speaking at the annual meeting on May 10th, Mr. C. F. Tufnell (chairman) said that progress was maintained during 1926 in spite of the difficult conditions, and a dividend of 7 per cent. was being paid on the ordinary shares. The delivery of the new generating set was delayed, but the set was eventually put into commission at the end of the year. The directors had decided to reduce charges; they would have been able to do so earlier had it not been for the industrial troubles. It was proposed to create 20,000 £1 preference shares bearing an 8 per cent. cumulative dividend. Those shares would not be issued for cash but offered to the debenture holders in exchange for their holdings. The report and accounts were adopted, and subsequently a resolution approving the increase of the company's capital was passed.

### Potteries Electric Traction Co., Ltd.

The total revenue for the past year was £251,914, and after meeting all expenses, including debenture interest, there remains a balance of £2,549, which it is proposed to carry forward. At December 31st last the reserve stood at £126,750, and the renewals fund at £43,539. The company's business was seriously affected by the industrial unrest; there was a profit on the omnibuses, but losses on the tramway services. The differences between the company and the Stoke-on-Trent Corporation are considered by the Minister of Transport to be capable of solution between the two authorities themselves. Meeting: May 28th.

### Eastern Telegraph Co., Ltd.

The revenue for 1926 amounted to £3,436,690 and the balance on working was £1,097,961. After providing for income tax, debenture interest, and preference dividends, there remains £850,909, to which is added £555,716 brought forward, making £1,406,625. Of this £400,000 is placed to general reserve, and £493,002 of that fund has been applied in writing off the balance of expenditure on new cables, &c. Four quarterly dividends of 2½ per cent., free of tax, have been paid on the ordinary stock and £506,625 is carried forward. The report records the death of Mr. A. R. Hardie, a director. Meeting: May 24th.

### French Companies.

The *Société Radio-Orient* has declared a dividend of 35 fr. per share out of net profits of 652,000 fr. for 1926, as compared with 30 fr. and 360,000 fr. respectively in the preceding year.

The *Union d'Electricité*, Paris, after placing 36,000,000 fr. to reserve and depreciation, intends to pay a dividend of 9 per cent. for 1926, as against 8 per cent. in the previous year.

The *Société de l'Electrification Industrielle*, which undertakes the establishment of h.p. lines, &c., for various supply companies, reports net profits and balance forward amounting to 1,336,000 fr. for 1926. The dividend is 11 fr. per share.

### Stock Exchange Notices.

Dealings in the following have been specially allowed by the Committee under Rule 159:—

Buenos Aires Lacroze Light and Power Co.—£300,000 6½ per cent. sterling redeemable mortgage debenture stock, issued at £96½ per cent., partly paid and fully paid.

Electric Supply Corporation.—50,000 new ordinary shares of £1 each, fully paid, Nos. 150,001 to 200,000.

Application has been made to the Committee to allow the following to be quoted officially:—

Consolidated Gas, Electric Light and Power Co. of Baltimore.—82,794 common shares of no nominal or par value.

North Metropolitan Electric Power Supply Co.—850,000 ordinary shares of £1 each, fully paid, Nos. 1 to 850,000.

Atlas Light and Power.—£889,757 5 per cent. debenture stock.

Electrical Finance and Securities.—100.000 7 per cent. cumulative preference shares of £1 each, 2s. paid, Nos. 1 to 100,000; £100,000 5½ per cent. debenture stock, issued at 92½ per cent., £10 paid.

### British Electric Traction Co., Ltd.

A final dividend of 5 per cent. is recommended on the ordinary stock, making 8 per cent. for the year, as for 1925-26. A further dividend of 2 per cent. is also recommended on the 6 per cent. cumulative participating preference stock, making 8 per cent. An extraordinary meeting was held on Tuesday last, when a proposal to issue a 10 per cent. bonus to ordinary stockholders in the form of deferred ordinary stock was approved.

### German Companies.

The *Korting Electricity Works Company*, Berlin, proposes to pay a dividend at the rate of 8 per cent. out of net profits of 204,000 marks for 1926, as compared with the same rate, and 187,000 marks in the previous year.

The *Dr. Paul Meyer Company*, Berlin, which was reorganised last year, reports a net profit of 251,000 marks for 1926, as compared with a loss of 2,200,000 marks in 1925. It is proposed to pay a dividend of 6 per cent. The export trade is stated to have declined, while favourable development has taken place in the home market.

### Belgian Companies.

The *Société d'Electricité et de Traction* reports net profits of 5,218,000 fr. for 1926, as compared with 4,187,000 fr. in the previous year. The dividend is 27.50 fr. per ordinary share.

The *Compagnie Belge d'Exploitations Electriques* has declared a dividend of 25 fr. per share for 1926.

The *Federation d'Entreprises de Transports et d'Electricité*, Brussels, which is an investment concern, reports net profits of 1,098,000 fr. The dividend is at the rate of 19 fr. per share.

### Spanish-Argentine Company.

The *Compania Hispano-Americana de Electricidad*, of Madrid (the former *German Transmarine Electricity Co.*), reports that the sum of 40,000,000 pesetas has been set aside for depreciation, as compared with 34 millions in 1925, leaving a net profit of 38,976,000 pesetas for 1926, as against 38,873,000 pesetas. It is intended to pay a dividend at the rate of 14 per cent., as in 1925.

### Argentine Company.

The *Compañia Italo-Argentina de Electricidad*, Buenos Aires, reports a liquid profit of $4,569,500 for 1926. A total dividend of $10 m/n has been paid. The extension of the Pedro Mendoza station, aiming at the attainment of the maximum power of 100,000 kW, continued during the year, and the erection of the first of the 25,000/30,000-kVA turbo-generators was almost completed.

### Companies Struck off the Register.

The names of the undermentioned companies have been struck off the Register, and they are thereby dissolved:—

Adnil Electric Co., Ltd.
"Cedes" Electric Traction, Ltd.
Electrical Industries, Ltd.
Leitner Electrical Co., Ltd.
Maxim Lamp Works, Ltd.
Portable Electric Motors (1919), Ltd.

### Birmingham District Power and Traction Co., Ltd.

The revenue for the past year was £119,740, and the available surplus (including £19,890 brought forward) was £123,522. After providing for debenture service, preference dividend and renewals, it is proposed to place £7,260 to reserve, to pay a dividend of 7 per cent. on the ordinary shares, and to carry forward £36,953. During the year debenture stock to the value of £14,265 was redeemed and cancelled. The meeting was to be held on May 18th.

### Rothesay Tramways Co., Ltd.

The receipts for 1926 fell slightly to £19,720. The available balance (including £671 brought forward) is £1,815. It is proposed to pay 5 per cent. on the preference shares and carry forward £1,315. Last year the ordinary shares received 3 per cent.

### Eastern Extension, Australasia and China Telegraph Co., Ltd.

The report for 1926 shows a gross revenue of £2,047,033 and a surplus of £1,115,975. After providing for taxation and debenture interest, there remains a balance of £951,996, to which is added £413,435 brought forward, making £1,365,431. From this £550,000 is transferred to general reserve; four tax-free dividends of 2½ per cent. each have been paid, and £415,431 remains to be carried forward. Meeting: May 26th.

### Greenock and Port Glasgow Tramways Co.

The receipts for 1926 fell from £65,448 to £64,462. After providing for debenture interest, depreciation, &c., there is a net loss of £2,283. Against this is set a balance of £2,371 brought forward, leaving a balance of £88 to be carried forward. The unsatisfactory result is attributed to motor omnibus competition. The company proposes to substitute 'buses for trams on a part of its system.

### Oriental Telephone and Electric Co., Ltd.

The directors recommend a final dividend of 6 per cent. on the ordinary shares (free of tax), making a total of 10 per cent. for the year, free of tax, plus a bonus of 2 per cent., free of tax.

### Adelaide Electric Supply Co., Ltd.

The usual interim dividends of 4 per cent. on the preferred ordinary shares and 6 per cent., free of tax, on the ordinary shares, have been declared.

### Shanghai Electric Construction Co., Ltd.

A final dividend of 6 per cent. (making 10 per cent. for the year, as in 1925) is recommended on the ordinary shares.

### Melbourne Electric Supply Co., Ltd.

An interim dividend at the rate of 10 per cent. per annum, free of tax, has been declared on the ordinary shares.

### Bengal Telephone Corporation, Ltd.

A dividend of 6 per cent. has been declared on the ordinary shares, as against 2 per cent. for 1925.

### Burma Electric Supply Co., Ltd.

An interim dividend of 4 per cent. has been declared on the ordinary shares, as in 1926.

## Stocks and Shares.

MONDAY EVENING.

IMPATIENCE girds, with a touch of exasperation, at the delay that has occurred in the expected fall to 4 per cent. in the Bank rate. The last change was made on April 21st, and on each successive Thursday there has been a confident anticipation of a further reduction. Stock Exchange markets are counting upon a decline, and new issues achieve notable success in cases where sound stock is offered. "If the Bank rate falls," people argue, "we shall see prices go higher than they are to-day." Business in the industrial departments is tolerably active, with prices well maintained. Our own lists are typical of the general trend, and this week there are four declines to set against nearly a score of rises.

County of London Electric new 5 per cent. debenture, offered at 96, and promptly covered several times over by public subscription, rose from an opening premium of 17s. 6d. until it touched nearly a point higher. At 1¼ premium scrip came to market, and reaction took back the price to 1¼ premium. So many other new candidates have presented themselves for favour during the past fortnight that investment finds it very tempting to change from one thing to another. Buenos Aires Lacroze 6½ per cent. redeemable debenture stock, offered at 96½, is now marketable, the price being about 1 premium. When the market opened in the new Electrical Finance and Securities issues, there was a small premium on the 7 per cent. preference shares, but this ran off, although the 5½ per cent. debenture stock retained a point premium above the issue price of 92½. It may be mentioned that the ordinary shares are all held privately: they received annual dividends of 10 per cent. for the past six years, 1921-1926 inclusive.

Brazilian Tractions, as spectacular speculative leaders, have fallen temporarily out of the front rank, being superseded by other favourites. The common shares are 2¼ points down at 141½. Barcelona Tractions have drooped to 53, and Sidros attract but little attention.

Foreign telephone varieties are strong. United River Plates have been forging ahead steadily for some time past, and are again better at 9¼. Chili Telephones, usually a staid and somewhat humdrum investment, are 18s. 9d. higher this week at 7¾, jobbers in the market professing some mystification as to what can be the reason for the demand that has swept the shares to their present level. The obvious inference would be buying for control, and in this supposition there may be

an explanation, although nothing definite has transpired to verify it. Anglo-Portuguese Telephones are also rising, the price having advanced to 20s. 9d. The company paid 7 per cent for last year, and at the meeting, held six weeks ago, Lord St. Davids, the chairman, mentioned 8 per cent. as "what you may call the normal rate which the ordinary shareholders in a telephone company expect." Automatic Telephones have fallen to 45s.

Clyde Valley shares are 6d. lower at 30s. 6d. The Central Electricity Board has published the first of the schemes now under preparation by the Electricity Commissioners in pursuance of Section 4 of the Electricity (Supply) Act, 1926. This deals with Central Scotland, and upon adoption of the scheme by the Board, the latter body will put the proposals into operation. The scheme is bold and far-reaching, likely to give rise to criticism as well as to arouse commendation. The Stock Exchange interest lies in the probabilities that it opens of capital requirements in the future, and the advantage that provision of cheap current will afford to the industries in the area served. The East Anglian Electricity Supply Company's scheme is under consideration by a Select Committee of the House of Commons. American capital, according to the evidence presented last week, is invested in the Greater London and Counties Trust, Ltd., which was prepared to find half-a-million pounds, or more, for the purpose of carrying-out the scheme in the Bill.

The Official Receiver has in hand the affairs of the Southern Counties Electric Light and Power Supply, Ltd. Meetings of creditors and shareholders were held last week, under the compulsory winding-up order made against the company. The directors attribute the company's failure to its having insufficient capital at any one time to carry out its undertakings, and other reasons. Readers of the ELECTRICAL REVIEW will remember that warnings were raised here against investment of money in the company's shares and debentures. The Southern Counties Electric Light and Power Supply, Ltd., has for its chairman Sir Charles B. H. Soame, Bart. The experience of holders unfortunate enough to own interests in the Southern Counties Electric Light and Power Supply, Ltd., is one which should not be forgotten by people who are tempted to embark money in schemes that have hardly a chance of success.

Brush Electrical shares remain at 28s. 3d., unaffected by the issue of a report repeating the previous 10 per cent. dividend, and showing net profits of £62,900, about £700 more than that of the previous year. A "reasonably busy year" is forecast for 1927. Siemens, as already stated (ELECTRICAL REVIEW, May 13th, p. 771) is paying 7½ per cent., also as before, and the price of the shares is 1s. 9d. better at 28s. 6d. The report is very satisfactory. Johnson & Phillips have gained 3s. 6d., at 2½ ex dividend.

Underground Railway stocks have not moved. British Electric Traction stocks retain their substantial rises. The Pernambuco Tramways and Power made a little more profit than in the previous twelvemonth, and again pays the preference dividend of 7 per cent. The price of the shares stands at 16s. 6d., and the ordinary at 6s. 6d. La Plata Trams, after a dip to 3s. 9d., rallied to nearly 5s. Reference was made earlier in the month to vague rumours as to the La Plata Company being coveted by another group. The ordinary shares are a gamble—though an interesting one—because the cumulative preference, now quoted at 20s., carry nearly 14s. per share arrears of dividend.

In December last year the North Metropolitan Electric Power Supply Company announced its intention to pay off at par, on July 1st next, the £250,000 8 per cent. cumulative second preference stock. Stockholders are now offered the right to exchange into the company's 6 per cent. preference shares at par, 20s., carrying dividend as from April 30th, 1927. The existing shares are quoted at 22s. ex dividend. The second preference stock changed hands a few days ago at 105.

The cable list is very hard, and a number of further advances have occurred. Great Northerns are 5s. up, the net profit of £271,200 being £18,000 more than that of 1925. Indo-Europeans, ex their dividend of 37s. 6d. net, have put on 17s. 6d. In the Eastern division, "China" shares rose to 18½. A better tendency, too, characterises Marconis. The Marine Company's good showing helped to direct attention to the market. Marconi Marines, ex dividend, are up ½, and the parent shares touched 19s. 9d. before easing off to 18s. 9d. A few pence were added to Canadian Marconis at 4s. 3d.

Rubber shares present no new points of interest. In the engineering section Babcocks went back a trifle, to 54s. 6d. The iron, coal and steel issues are fairly firm, without any feature developing. Armstrong junior debentures continue to be persistently bought by people in the North of England.

Amongst the dollar stocks, Shawinigan Water common has gained 4 points, at 92. The Mexican Utility issues are somewhat irregular. Profit-taking occurred in Mexican Light and Power preferred, the price shedding a couple of dollars, which, however, were added to the price of the company's 5 per cent. bonds. Mexico Tramways bonds are 1 higher. The Burma Electric Supply interim dividend of 4 per cent. is at the same rate as that of last year. The price of the ordinary shares is 2⅜s. 6d., and the 6 per cent. preference stand at 16s. 3d. Amongst the newcomers, Electrical Distribution of Yorkshire ordinary shares, issued recently at 25s., are changing hands on the basis of 3s. 6d. premium.

# Share List of Electrical Companies.

### HOME ELECTRICITY COMPANIES.

| | Nom. | Dividend. 1925. | Dividend. 1926. | Price May 16, 1927. | Rise or fall. | Yield. |
|---|---|---|---|---|---|---|
| | £ | | | | | p.c. |
| Bournemouth and Poole ... ... | 1 | 14 | 14 | 37/- | — | 4 18 3 |
| Brompton Ordinary ... ... ... | 1 | 10 | 8¾ | 25/-xd | — | 5 12 0 |
| Charing Cross Ordinary ... ... | 1 | 15 | 8¼ | 25/- | — | 5 12 0 |
| do. do. 4½ Pref. ... | 1 | 4½ | 4½ | 17/- | — | 5 6 0 |
| Chelsea ... ... ... ... ... | 1 | 12 | 8¾ | 25/-xd | +1/- | 5 12 0 |
| City of London ... ... ... | 1 | 15 | 10 | 1¾ | — | 5 1 10 |
| do. do. 6% Pref. ... ... | 1 | 6 | 6 | 22/6 | — | 5 6 8 |
| Clyde Valley ... ... ... ... | 1 | 8 | 8 | 30/6 | —6d. | 5 5 0 |
| County of London ... ... ... | 1 | 15 | 7½ | 28/- | — | 5 0 0 |
| do. do. 6% Pref. ... ... | 1 | 6 | 6 | 22/6 | — | 5 6 8 |
| Edmundson's Ordinary ... ... | 1 | 7 | 8 | 26/9 | — | 5 19 8 |
| do. 7% Pref. ... ... | 1 | 6 | 7 | 23/6 | — | 5 19 2 |
| Elec. Supply Corporation ... ... | 1 | 10 | 10 | 32/- | — | 6 5 0 |
| Kensington Ordinary ... ... | 1 | 15 | 8 | 28/- | — | 5 12 0 |
| Lancs. Light and Power ... ... | 1 | 7½ | 7½ | 27/- | — | 5 11 1 |
| London Electric ... ... ... | 1 | 10 | 8½ | 24/- | — | 5 16 8 |
| do. do. 6% Pref. ... ... | 5 | 6 | 6 | 5⅝ | +¼ | 5 6 8 |
| Metropolitan ... ... ... ... | 1 | 11 | 6 | 29/- | +6d. | 4 16 7 |
| do. 4½% Pref. ... ... | 1 | 4½ | 4½ | 17/- | — | 5 2 10 |
| Midland Counties ... ... ... | 1 | 5½ | 6 | 23/6 | — | 5 6 8 |
| Newcastle-on-Tyne Ordinary ... | 1 | 7 | 5 | 23/6 | — | 4 5 1 |
| do. 5% Pref. ... | 1 | 5 | 5 | 17/6 | — | 5 14 3 |
| do. 7% Pref. ... | 1 | 7 | 7 | 24/- | — | 5 16 8 |
| Notting Hill 6% Pref. ... ... | 10 | 6 | 6 | 10 | — | 6 0 0 |
| North Met. Elec. 6% Pref. ... | 1 | 6 | 6 | 22/- | — | 5 9 1 |
| St. James' and Pall Mall ... ... | 5 | 17½ | 8 | 25/6 | — | 5 9 10 |
| South London ... ... ... ... | 1 | 15 | 8½ | 25/- | — | 5 12 0 |
| South Metropolitan Pref. ... ... | 1 | 7 | 7 | 1¼ | — | 6 3 0 |
| Urban Ordinary ... ... ... | 1 | 4 | 7 | 27/- | +9d. | 5 3 8 |
| do. 6% Pref. ... ... | 1 | 6 | 6 | 1 1/8 | — | 5 13 0 |
| Westminster Ordinary ... ... | 1 | 15 | 8½ | 25/- | — | 5 12 0 |
| Whitehall Elec. Invst. 7½% Pref. ... | 1 | 7½ | 7½ | 20/6 | +3d. | 7 6 4 |
| Yorkshire Elec. ... ... ... | 1 | 8 | 8 | 29/6 | — | 5 8 4 |

### HOME RAILS.

| | | | | | | |
|---|---|---|---|---|---|---|
| Central London Ord. Assented ... | Stock | 4 | 4 | 71 | — | 5 12 8 |
| Metropolitan ... ... ... ... | ,, | 5 | 3 | 64 | — | 4 13 9 |
| do. District ... ... | ,, | 3½ | 3½ | 63 | — | 5 11 0 |
| Underground Electric ... ... | £1 | Nil | 1½ | 18/6 | — | 1 12 5 |
| do. do. Income ... | Bonds | 6 | 6 | 102 | — | *5 17 8 |

### TELEGRAPHS AND TELEPHONES.

| | | | | | | |
|---|---|---|---|---|---|---|
| Anglo-Am. Tel. Pref. ... ... | Stock | 6 | 6 | 101 | — | 5 19 0 |
| do. Def. ... ... | ,, | 1½ | 1½ | 24¼ | — | 6 3 9 |
| Automatic Telephone ... ... | 1 | 8 | 10 | 45/- | —1/6 | 4 9 0 |
| Chili Telephone ... ... ... | 5 | 5 | 6 | 7¾ | +18/9 | 4 1 4 |
| Eastern Extension ... ... ... | 10 | 10 | 10 | 18½ | +¼ | *5 10 4 |
| Eastern Tel. Ord. ... ... ... | Stock | 10 | 10 | 180 | — | *5 11 1 |
| Globe Tel. and T. Ord. ... ... | 10 | 10 | 10 | 18¾ | — | *5 6 0 |
| do. do. Pref. ... | 10 | 6 | 6 | 11 | — | 5 8 1 |
| Great Northern Tel. ... ... | 10 | 20 | 20 | 28½ | +¼ | 6 19 2 |
| Indo-European ... ... ... | 25 | 8½ | 10 | 46½xd | +7/9 | *5 7 6 |
| Marconi ... ... ... ... ... | 1 | Nil | Nil | 18/9 | +1/6 | ... ... |
| Marconi-Marine ... ... ... | 1 | 7½ | 8½ | 25/6xd | +¼ | 6 17 3 |
| Oriental Telephone Ord. ... ... | 1 | 12 | 12 | 53/6 | +1/- | *4 9 9 |
| United R. Plate Tel. ... ... | 5 | 8 | 8 | 9½ | +¼ | *4 6 6 |
| Western Telegraph ... ... ... | 10 | 10 | 10 | 17⅞ | — | *5 15 1 |

### HOME AND FOREIGN TRAMS, &c.

| | | | | | | |
|---|---|---|---|---|---|---|
| Anglo-Arg. Trams First Pref. ... | 5 | 5½ | 5½ | 9½ | — | 7 17 2 |
| do. do. 2nd Pref. ... | 5 | 6 | 6 | 8½ | — | 8 2 8 |
| do. do. 5% Deb. ... | Stock | 5 | 5 | 72½ | +1 | 6 18 0 |
| British Electric Traction Ord. ... | ,, | 8 | — | 150 | — | 5 6 8 |
| do. do. 6% Pref. ... | ,, | 6 | 8 | 120 | — | 6 13 4 |
| Brazil Traction ... ... ... | 100 | 5 | 6 | 141½ | —2½ | 4 4 10 |
| Brit. Columbia Elec. Rly. Pcs. ... | Stock | 5 | 5 | 89½ | — | 5 11 9 |
| do. do. Preferred ... | | 6¾ | 6¾ | 118½ | — | 5 5 6 |
| do. do. Deferred ... | ,, | 8 | — | 158 | — | *5 1 3 |
| do. do. Deb. ... | ,, | 4¾ | 4¾ | 80½ | — | 5 5 7 |
| London & Sub. Trac. 5% Pref. ... | 1 | Nil | Nil | 7/9 | — | Nil |
| London United Tram. Deb. ... | Stock | 4 | 4 | 51 | — | 7 16 10 |
| Mexico Trams, 5% Bonds ... ... | — | 5 | 5 | 80½ | +1 | 6 4 3 |
| Mexican Light Common ... ... | 100 | Nil | Nil | 45 | — | Nil |
| do. Pref. ... ... | 100 | Nil | Nil | 113 | —2 | Nil |
| do. 1st Bonds ... ... | — | 5 | 5 | 74½ | +2 | 6 14 3 |
| Yorkshire (West Riding) ... ... | 1 | 5 | — | 8/9 | — | ... ... |

### MANUFACTURING COMPANIES.

| | | | | | | |
|---|---|---|---|---|---|---|
| Babcock & Wilcox ... ... ... | 1 | 13 | 13 | 54/6 | —6d. | 4 15 5 |
| British Aluminium Ord. ... ... | 1 | 12½ | 10 | 43/9 | — | 4 11 4 |
| British Elec. Transformer Pref. ... | 1 | Nil | 7 | 18/3 | — | 7 13 6 |
| British Insulated Ord. ... ... | 1 | 15 | 15 | 68/9 | — | 4 7 3 |
| Brush Ord. ... ... ... ... | 1 | 10 | 10 | 28/3 | — | 7 1 7 |
| Callenders ... ... ... ... | 1 | 15 | — | 3½ | — | 4 5 9 |
| do. 6½% Pref. ... ... | 1 | 6½ | 6½ | 23/9 | — | 5 9 8 |
| Crompton Ord. ... ... ... | 1 | Nil | Nil | 10/- | — | ... ... |
| Edison-Swan ... ... ... ... | 4/- | 10 | 10 | 10/ | — | 4 0 0 |
| do. 5% Deb. ... ... | Stock | 5 | 5 | 85 | — | 5 17 8 |
| Electric Construction ... ... | 1 | 10 | 10 | 29/9 | — | 6 19 2 |
| Enfield Cable Pref. ... ... | 1 | 7½ | 7½ | 1¼ | — | 6 6 4 |
| English Electric ... ... ... | 1 | Nil | Nil | 10/- | — | ... ... |
| do. do. Pref. ... | 1 | 8 | — | 12/6 | — | ... ... |
| Gen. Elec. Pref. ... ... ... | 1 | 6½ | 6½ | 23/6 | — | 5 10 8 |
| do. Ord. ... ... ... | 1 | 7½ | — | 30/6 | — | 4 18 4 |
| Henley ... ... ... ... ... | 1 | 20 | — | 90/- | — | 4 8 11 |
| do. 4½% Pref. ... ... ... | 5 | 4½ | 4½ | 4¼ | — | 5 6 0 |
| India-Rubber ... ... ... ... | 1 | 5 | 5 | 1⅛ | — | *4 9 0 |
| Johnson & Phillips ... ... ... | 1 | 17½ | 12½ | 2½xd | +3/6 | 5 0 0 |
| Met.-Vickers Ord. ... ... ... | 1 | 8 | 8 | 27/6 | — | 5 11 4 |
| do. Pref. ... ... ... | 2 | 8 | 8 | 2⅜ | — | 6 14 9 |
| Siemens Ord. ... ... ... ... | 1 | 7½ | 7½ | 28/6 | +1/9 | 5 5 2 |
| Telegraph Construction ... ... | 12 | 10 | 10 | 28½ | — | *4 4 2 |

* Dividends paid free of Income Tax.

# Our Foreign Electrical Trade.

## Electrical Exports and Imports during April, 1927.

THE Board of Trade returns for April show that there was a further decline in our electrical exports, amounting to £128,304, as compared with the March figure, although when placed against the exports of April last year a substantial rise is apparent. It must be said, however, that April, 1926, was a bad month, exports reaching a very low level; April, 1925, however, was the best month of that year. Comparing last month and March, it will be seen that the machinery section experienced a large decline, the three classes dealt with showing a total fall of over £106,000. Apart from this the only decrease of any magnitude occurred in the case of insulated wires and cables. The other two cable classes (telegraph and telephone) recorded a combined rise of about £21,000. Appreciable increases occurred in the cases of glow lamps and telegraph and telephone apparatus. The increase as compared with April, 1926, was fairly general, outstanding items being unenumerated electrical goods and apparatus, unenumerated electrical machinery, submarine cables, and batteries and accumulators. There were also two substantial decreases, *viz.*, in telegraph and telephone instruments and apparatus and "other motors and generators."

There was a general decrease of imports as compared with March, and only two increases were recorded—in carbons and unenumerated electrical machinery. The imports of unenumerated goods and apparatus were substantially reduced but the rest of the net decrease of £35,730 was fairly evenly distributed. In comparison with April, 1926, although increases and decreases were about equal in number there was a rise of £29,976. This was mainly due to an increase in unenumerated machinery imports (£36,011). The imports of insulated wires and cables were also up £13,480. The decreases were not very large, with the possible exception of non-submarine telegraph and telephone cables in which the fall was proportionately heavy.

| | Exports. | | | Imports. | | | Re-Exports. | | |
|---|---|---|---|---|---|---|---|---|---|
| | Electrical exports for Apl., 1927. | Inc. or dec. as compared with Mar., 1927. | Inc. or dec. as compared with Apl., 1926. | Electrical imports for Apl., 1927. | Inc. or dec. as compared with Mar., 1927. | Inc. or dec. as compared with Apl., 1926. | Electrical re-exports for Apl., 1927. | Inc. or dec. as compared with Mar., 1927. | Inc. or dec. as compared with Apl., 1926. |
| Electrical goods and apparatus (unenumerated) ... ... | £220,846 | + £3,810 | + £71,388 | £97,778 | −£20,224 | − £9,099 | £3,807 | − £612 | −£4,355 |
| Insulated wires and cables ... | 206,349 | − 54,376 | + 23,222 | 60,984 | − 2,591 | + 13,450 | 754 | + 237 | − 320 |
| Glow lamps ... ... ... | 63,580 | + 11,125 | + 27,723 | 19,361 | − 8,263 | + 1,897 | 965 | − 2,628 | + 433 |
| Arc lamps and parts ... ... | 1,032 | − 2,952 | + 302 | 2,240 | − 236 | + 1,498 | 110 | − 1,027 | + 108 |
| Batteries and accumulators ... | 93,849 | − 9,020 | + 35,625 | 41,967 | − 2,409 | + 3,499 | 726 | + 489 | − 1,396 |
| Meters and instruments ... | 29,158 | − 1,526 | − 2,957 | 19,556 | − 6,889 | + 225 | 723 | + 395 | − 64 |
| Carbons ... ... ... | 2,081 | − 2,321 | + 1,200 | 8,975 | + 4,982 | − 1,889 | 147 | + 120 | + 93 |
| *Electrical Machinery—* | | | | | | | | | |
| Electrical machinery (unenumerated) ... ... ... | 288,996 | − 36,486 | + 75,979 | 147,415 | + 8,687 | + 36,011 | 9,881 | + 1,096 | + 1,921 |
| Railway and tramway motors | 35,345 | − 3,463 | + 13,001 | — | — | — | — | — | — |
| Other motors and generators .. | 146,640 | − 66,674 | − 30,861 | — | — | — | — | — | — |
| Switchboards (not telegraph or telephone) ... ... | 4,963 | − 5,063 | − 4,528 | — | − 13 | − 26 | — | − 4 | — |
| *Telegraph and Telephone Cable and Material—* | | | | | | | | | |
| Telegraph and telephone wires and cable (not submarine) | 65,465 | + 9,711 | − 307 | 4,472 | − 445 | − 7,917 | 2,110 | + 2,098 | + 2,050 |
| Submarine telegraph and telephone cable... ... ... | 49,644 | + 11,512 | + 37,487 | — | — | — | — | — | — |
| Telegraph and telephone instruments and apparatus ... | 200,839 | + 17,389 | − 37,301 | 28,238 | − 8,329 | − 7,673 | 3,748 | + 528 | − 598 |
| Totals ... ... | £1,409,087 | −£128,304 | +£209,973 | £430,986 | − £35,730 | + £29,976 | £22,971 | + £692 | − £2,133 |
| Increases and decreases for four months of 1927 ... | | Exports: + £583,852 | | | Imports: + £188,467 | | | Re-Exports: − £12,747 | |

# Conditions in Poland.

A REPORT upon the industrial, commercial and financial situation in Poland in 1926 has been prepared for the Department of Overseas Trade by Mr. R. E. Kimens, C.M.G., Commercial Secretary at Warsaw (Stationery Office, 1s. 6d. net). Mr. Kimens refers to the adverse effects of the introduction of the gold standard, but states that the favourable balance of trade was maintained, one factor assisting Poland being the British coal stoppage. The Government has introduced measures for encouraging export trade; the export duties on a number of articles have been abolished or reduced, and export premiums are being paid in respect of certain finished manufactured goods. Great Britain was the third largest supplier of foreign goods to Poland in 1926, and the second largest buyer of Polish products. It is stated that the supply of machinery, plant, and equipment is still largely in the hands of Germany, and the conclusion of a commercial treaty between Germany and Poland will still further aid the former. There is a market in Poland for many kinds of machinery, including large motors and generators and coal cutters, as well as household appliances, such as vacuum cleaners. During 1926 Poland imported electrical goods and apparatus valued at 26,699,000 gold zloty (43.79 zloty to the £, December 31st last) and exported such goods to the value of 440,000 zloty. Advice to those desiring to trade with Poland is given by Mr. Kimens; this may be summarised as follows:—Prices must be competitive, even better-class articles should not exceed the price of competitive articles by more than 10-15 per cent.; favourable conditions of payment should be allowed—with proper caution, business can be done on a credit basis without undue risk; the goods offered should be adapted to the country's requirements, which vary in different provinces; prices, if possible, should be quoted c.i.f. Danzig or Gdynia; a knowledge of English is not general—Polish, French or German should be employed in communications; catalogues, photographs, and drawings should accompany offers, and the metric system should be used. Agents should be regularly visited, and should be English or Polish; they should be allowed to carry consignment stocks if possible. Goods should not be dispatched until an import licence is actually issued, and should not be consigned to a German port for transhipment.

# United States Electrical Production.

### Two Years' Progress.

THE results, so far as they concern the electrical manufacturing industry, of the 1925 Biennial Census of the United States Department of Commerce, were summarised in a recent issue of the *Electrical World*. In all cases the figures are compared with those obtained in the 1923 census. It is shown that the number of establishments rose from 1,671 to 1,739 in the two years—an increase of 4.1 per cent., while the average number of wage-earners rose from 234,892 to 239,921—2.1 per cent. The wages paid increased by 6 per cent. to $323,834,541. The total value of products rose by 19.1 per cent., *viz.*, from $1,293,001,771 to $1,540,002,041; the value of electrical machinery, apparatus, and supplies produced in 1925 was $1,444,287,799. In addition, electrical machinery, apparatus and supplies, are manufactured to some extent as secondary products by establishments engaged primarily in other lines of manufacture. The value of such commodities thus produced in 1925, outside the industry proper, was $82,465,360, but the corresponding value in 1925 has not yet been calculated. An analysis of the establishments reveal that New York is the most important state in electrical manufacturing with 334 establishments; there are 236 in Illinois, 205 in Ohio, 142 in New Jersey, 133 in Pennsylvania, 116 in Massachusetts, and 110 in California; the remainder (463) are distributed over 30 states.

From the detailed analysis of production, it is seen that apart from two large groups ("miscellaneous electrical machinery, apparatus and supplies," $327,616,225, and "all other electrical machinery, apparatus, and supplies," $231,692,684), the most important section was "generators, motor-generator sets and transformers," $172,005,613 (as compared with $165,491,396 in 1923). Radio apparatus followed very closely upon this section, the value of the output having risen from $54,000,470 in 1923 to $170,197,861 in 1925. The third largest section was that covering primary and storage batteries, the total value of which increased from $118,065,613 in 1923 to $155,245,226. The production of motors in 1925 was valued at $112,543,596 (against $109,188,685 in 1923). The largest specified class of motors was the polyphase induction type of 200 h.p. and under, the production value of which is given as $34,653,950 (as compared with $35,586,235 in 1923). The value of fractional h.p. motors produced rose from $23,939,172 in 1923 to $28,249,265 in 1925. With regard to domestic appliances, which rose in total value from $67,002,084 to $74,726,908, details of the numbers of the various devices are given. Of the ten classes shown only two (vacuum cleaners and miscellaneous) recorded decreases; the figures, with the 1923 equivalent in parentheses, were as follows:—Air heaters, convector and radiant type, 416,654 (310,363); percolators 434,095 (260,030); toasters 735,856 (476,606); waffle irons, 306,527 (131,445); curling irons, 1,534,786 (no comparable figure); disk stoves, hotplates and ranges under 2½ kW, 178,585 (no figure for 1923); domestic ranges, 2½ kW and over, 70,931 (no figure for 1923); flat irons, 2,759,218 (2,434,280); vacuum cleaners 1,097,640 (1,240,742); water heaters, over 660 W, 53,936 (14,507); miscellaneous (value), $9,658,388 ($10,833,686). It is noted that although the number decreased the value of vacuum cleaners rose from $35,981,514 to $39,591,336. The total value of lamps produced in 1925 was $73,558,210, as compared with $71,966,225 in 1923. This total included $54,892,438, representing the value of 266,461,754 tungsten lamps, other than miniature types; 114,800,550 automobile lamps, valued at $12,432,676 were produced, as compared with 88,243,456, valued at $11,354,546 in 1923. Switchboards, panelboards, circuit breakers and switches, to the value of $69,072,044, were produced in 1925, comparing with $57,856,166 in 1923. The value of ignition apparatus produced in 1925 was $41,364,998. The only leading class of goods which recorded a decrease was telephone and telegraph apparatus (not including wireless), the value of which fell from $94,483,885 to $84,421,231. In conclusion, we give comparative values of production for other important sections:—Measuring instruments, relays and instrument transformers, $31,650,355 ($28,221,484); interior conduits and fittings, $43,328,140 ($35,305,341); motor control gear, $31,032,159 ($33,176,115); and electric fans $12,562,636 ($12,053,861).

### French Electrification Halt.

According to the *Electric Railway Journal*, the electrification of the seven regions in France, as outlined in the extensive programme which was started at the conclusion of the great war, has been held up because of lack of funds. The cost of construction is enormous, since long-term loans have risen in cost from 5 to 14 per cent. Several proposals for the completion of the programme have been made, but the only reasonable solution seems to be the stabilisation of the franc.

# Electrical Association for Women.

### Annual Luncheon.

THE second annual luncheon of the E.A.W. was held at the Hotel Cecil, London, on May 11th, under the chairmanship of Viscountess Astor, M.P., president.

Dr. S. Z. DE FERRANTI, F.R.S., following the loyal toasts, proposed "The Electrical Association for Women." He said that the growth of the E.A.W. was a sign of its utility. Nothing better could have happened for the development of the electrical industry than the formation of the Association. A new phase of the development upon which we were entering was the provision of electrical appliances in the home; electricity was the greatest labour saver available. Outside the professional classes it was more essential for women to have electrical knowledge than men. He congratulated Miss Haslett, director of the Association, on the success achieved by the body, which was largely due to her good organising. There were some able people working for the Association in the local centres. As an engineer he felt that the E.A.W. had a great future before it, and was indispensable to the industry.

Lady ASTOR, in response, said that it was due to the vision of a few ardent women that the Association had reached its present state of development. The Association was a wonderful inspiration to those who had women's welfare at heart. There was a fine quality of men behind the movement. Dr. Ferranti had been the Association's greatest friend—it was largely as a result of his efforts that the body ever got started.

"Electricity in the Service of the Community" was proposed by Maj.-Gen. Sir PHILLIP NASH, K.C.M.G. He said that electricity had already entered into almost every phase of our existence. Electricity in the home was well established for illumination purposes, and was fast coming into vogue for heating, cooking, and washing. Electrical power was now essential in industry. The greatest surgical discoveries of recent times would not have been possible without electricity. Broadcasting was another important phase; a few years ago it was considered a social amenity—a year ago it proved a means of maintaining our social stability. When it was considered that the structure of all matter was of electrical origin, it was realised what a great future electricity had. Each new discovery broadened the horizon and showed how electricity could serve man more. We were passing from an age when fuel and man power were wasted to one when, by means of electricity, they would be saved. In a few years' time it would be impossible to discuss international economics without electricity dominating the discussion. To-day Germany was importing and exporting electrical power. Italy was connected by h.p. lines with France and Switzerland, which saved the situation in Italy during the recent drought. Transmission lines were wanted to connect the centres of production of power with those of consumption. To maintain our industrial supremacy we must put ourselves in line with what other countries were doing. It was the duty of the Central Electricity Board to give a cheap and plentiful supply of electrical power. Sir Andrew Duncan and his colleagues had already published the first big scheme, Central Scotland (ELECTRICAL REVIEW, May 13th, 1927, p. 754), for the reorganisation of the supply industry. No greater help could be given than to increase the domestic load. The more the Association could make people clamour for electricity the greater the service it would do for the industry.

The toast was responded to by Dame HENRIETTA BARNETT, D.B.E., vice-president, E.A.W. Twenty years ago she inaugurated the Hampstead Garden suburb; all the original cottages were equipped with electric light. The Association, which was continually advancing under the guidance of Miss Haslett, would come to the relief of the overburdened woman and give her the opportunity to gain knowledge.

In proposing "Our Guests," Lady SNELL, vice-president E.A.W., heartily welcomed the visitors, referring particularly to Sir Andrew Duncan.

Sir ANDREW, in reply, recommended those present not to build their immediate hopes too high. Patience was necessary during the early stages of the Central Electricity Board's work. If Scotland had been favoured with regard to the first scheme, it was not due to him. He hoped that the scheme would set the pace for other areas.

Particulars of the Annual Conference, which preceded the luncheon, appear in our "Notes" pages.

### South Wales Centre.

In a recent lecture by Mrs. L. E. Wright, according to the *South Wales News*, before the South Wales and Monmouthshire centre of the E.A.W., at the South Wales Engineers' Institute, she gave an interesting description of the methods of electro-therapy which have become of special importance in the prevention and cure of disease. Mrs. Wright said that the adoption by the medical profession of these new methods of treatment had opened up an interesting sphere of work for women who were prepared to spend two or three years studying the theoretical and practical aspects and obtaining the requisite knowledge of anatomy and physiology.

# New Electrical Devices, Fittings and Plant.

**Readers are invited to submit particulars of new or improved devices and apparatus for publication in this Section.**

### A New Ironclad Switch-Fuse.

The illustration, fig. 1, depicts a new combined ironclad d.p. switch and fuse which has been designed and marketed by MESSRS. BERRY'S ELECTRIC, LTD., The Switch House, 85-86, Newman Street, Oxford Street, London, W.1. The apparatus has a commercial rating of 10-15 A, and is suitable for working pressures up to 250 V. The switch has a quick-make and -break, and its substantial copper blades are securely clamped to a square-section mica-insulated steel shaft turning in brass bearings. The porcelain fuse holders have a 3-in. straight

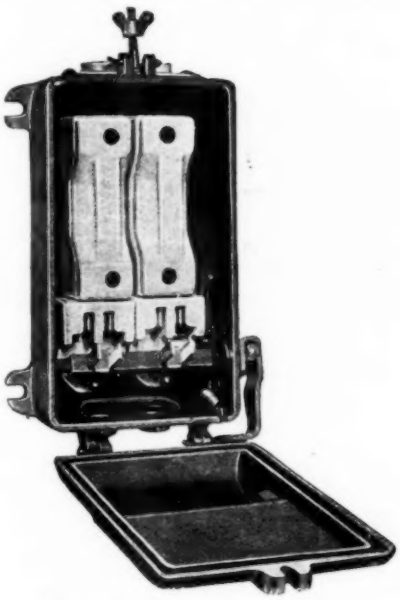


Fig. 1.—Ironclad d.p. Switch and Fuses.

"fuse break" and the copper base clips which accommodate the copper bridge blades are of the self-aligning type. Each pole is mounted on a separate porcelain base, and ample metal-to-case clearances are provided to meet the B.E.S.A. requirements. The internal fitments are all secured from the front. It is claimed that the leading-in cables are easily directed to their respective terminals, and are free from any possible abrasion by the switch shaft. The inlets and outlets are fitted with bushes accommodated in detachable end plates.

### Apparatus for Automatic Temperature Control.

A recent production of the DRAYTON REGULATOR & INSTRUMENT CO., LTD., West Drayton, is the "Drayton" transmitting electric thermo-contactor, for the automatic control of temperature. The apparatus consists of a bulb at the far end connected by means of capillary tubing to a helical Bourdon tube, the instrument end of which is connected by a metal strip to a spindle arranged in the tube axis and mounted between two end-plates. Any increase of the temperature to which the bulb is exposed imparts a turning movement to the tube and to the spindle. A contact arm is mounted on a bush carried on the spindle between two collars, connection to the spindle being arranged so that the arm can be set to any point on the scale without straining the tube. A bracket fixed to the front end-plate carries coaxially with the spindle a pin on which is mounted an insulating block carrying three contact arms. The pin further carries a pointer which indicates on a dial the position of the contact device. The three contact arms (common, low and high) are connected by flexible leads to the terminal screws at the top of the instrument. By means of a key the whole contact mechanism can be set to any point on the dial. Whilst the temperature is lower than that for which the contact mechanism is set the central moving contact arm makes contact with the left-hand (low) contact, but is moved to the right to make contact with the right-hand (high) contact when the indicated temperature is reached. The right- and left-hand contacts can be set to make and break within 2 deg. F. if desired, or within any higher temperature interval specified. The moving pointer is completely balanced so that it exerts no strain on the movement in whatever position it may be. The contacts are normally of silver-gold alloy, but tungsten-faced platinum may be employed where desired. The contacts are not intended to break the current, an electro-magnetically operated relay being employed for this purpose. The instrument is designed for working on pressures up to

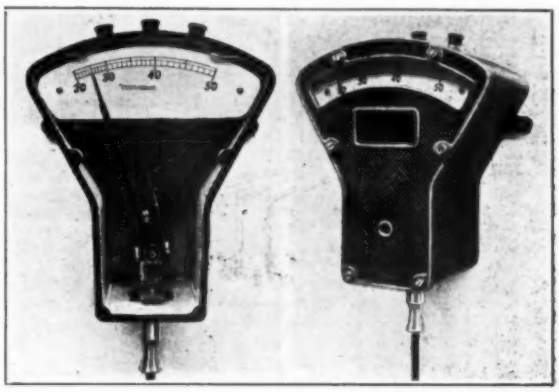


Fig. 2.—Temperature Control Apparatus.

250 V, and is made in standard ranges, covering temperatures up to 1,000 deg. F. Fig. 2 shows interior and exterior views of the control instrument.

### A New Electric Fan.

The accompanying illustration shows the "Ellipso" oscillating fan, a new product of MESSRS. BERKELEY & YOUNG, LTD., Hay Mills, Birmingham. It is suitable for a.c. or d.c. working. The makers claim that the elliptical movement of the fan is obtained by the simplest gear yet evolved. A simple traversing link is connected to and rotates with a slow-motion shaft, and is anchored by a universal ball joint to a fulcrum on the pedestal. A simple gearing transmits the drive from the motor spindle to the slow-motion shaft. The link is constructed to turn crankwise and increase and decrease its angle to the slow shaft, thereby giving an elliptical traverse.

Fig. 3.—An Oscillating Fan.

A simple friction clutch allows the drive to "cut-out" automatically in the event of the movable unit of the fan or guard being obstructed, and also automatically permits of the re-starting of the drive when the obstruction is removed. The clutch may be hand-operated, if desired, by means of a small knurled knob extending from the gear box. The fan can be used as a fixed or oscillating unit in either the desk or wall-bracket position. It can be supplied in various finishes to match decorating schemes. A 3-speed regulator is provided, and standard 12-in. blades are employed.

# A Remote-Control Public Lighting Scheme.

**A novel system of public lighting control has been adopted at Barnsley, where groups of separate street lighting sections are each, by means of relays, controlled by one switch.**

WITH a view to economy, the simplification of switching, centralisation of control, and levelling up of the times of lighting and extinguishing, a system of remote control for public lighting has been developed at Barnsley which presents several features of interest.

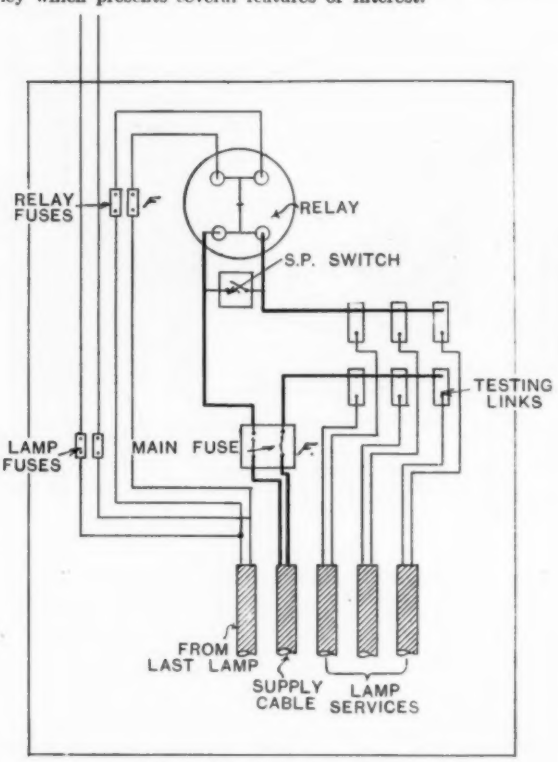



Fig. 1.—P.L. Control Arrangement.

Fig. 2.—Pillar and Standard.

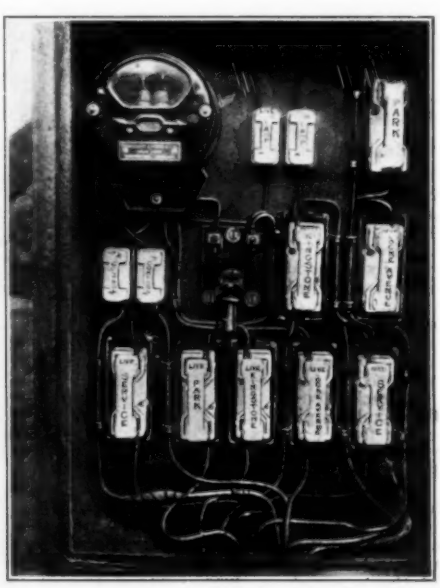


Fig. 3.—Control Chamber.

Since 1919 it has been the practice of the Corporation to lay a 0.0225-sq. in. twin armoured cable in the same trench with all new distributors. This cable is reserved entirely for public lighting and is fed from pillars, or other convenient points on the distribution system. It is looped into all the lamp standards along the route and is divided into sections, each supplying up to a maximum of approximately twenty 100-c.p. lamps, or their equivalent. At the last point on all but the last section a Chamberlain & Hookham relay is installed which is energised by the supply current and switched on with the lamps. The first section is hand controlled by an ordinary switch, each relay controlling the next section of lamps. A separate supply cable is, of course, put in at each relay point for lamps controlled by the relay. Fig. 1 shows the wiring arrangements at one of these control points, where a number of circuits are controlled by the one relay. In one case over 140 100-W lamps are switched on by a 10-A switch. The system is extremely flexible, and additions to or re-arrangements of the circuits are easily carried out. An important advantage is that any circuit may be fed from either a.c. or d.c. mains.

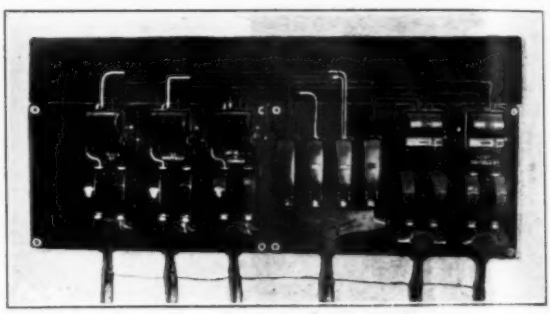


Fig. 4.—Hand Control Board.

Fig. 2 shows one type of lamp standard adopted for the relay control. The pillar chamber contains a board carrying the necessary fuses for several groups of lamps together with one of the relays already mentioned, and a s.p. switch. The s.p. switch is in parallel with the load side of the relay, and is used only for the inspection of the lamps during cleaning and for emergencies, should the relay fail to act. The arrangement is shown in greater detail in fig. 3. It is interesting to note that in the six years since the first relay was put into operation there has only been one failure, and that was due to causes outside the relay itself. The relays, though of the d.p. type, are adapted for s.p. use by bridging across the mercury cups.

Owing to the necessarily restricted space in the base of the standards, the twin cables are fitted with rubber tails the joint between the paper and rubber conductors being covered by lead sleeves, plumbed to the cable sheathing at their lower ends and filled with compound.

The standards are made locally for the Corporation to the design of Mr. E. A. Barker, M.I.E.E., chief electrical engineer.

It is probable that in the future the relay system will be extended so that ultimately the whole of the public lighting will be controlled from three or four sub-stations, all within easy reach of one another and the central station.

The old practice at Barnsley was to provide extra switch cores in the distributors from which the lamps were fed; this necessitated the tapping of the distributors at the lamp posts, with the consequent weakening of the network. Fig. 4 shows a hand-operated control board in one of the "subs." With this system the number of lamps on any one circuit was limited by the size of the switch wire and neutral. It has been found in practice that the separate cable costs very little more than the old system, at the same time carrying all the advantages enumerated above. The whole of the work on the new scheme has been carried out by the staff of the Corporation.

# Electrothermics.

## The electric furnace in industrial chemistry and metallurgy.

*(An abstract of three Cantor Lectures delivered by* CAPT. G. I. FINCH, *at the* ROYAL SOCIETY OF ARTS.)

COMPARED with fuel heating, the electrical generation of heat has many advantages, the chief of which are: 1, great temperature range, up to about 3,700 deg. C.; 2, perfect temperature control; 3, absence of waste flue gases and consequently high efficiency; 4, cleanliness; and 5, that electrically generated heat may be localised and applied exactly where required. The one objection to electric heating is its high cost. The value of heat energy should, however, be judged not only on a basis of quantity, but also on that of quality. The cost of one electrically generated calorie is approximately that of 18 fuel-produced calories.

The choice of resistor material depends primarily upon the maximum temperature aimed at. Of all solid conductors suitable for the purpose of electric resistance heating, carbon has by far the higher evaporisation temperature, about 3,700 deg. C. Its liability to oxidation, however, renders necessary the provision of an inert atmosphere and, again, the mechanical strength of different forms of carbon is such that in order to obtain sufficient robustness of the furnace resistor, it must be of large cross section. This necessitates the employment of high currents at low voltages and results in heat losses and more or less poor efficiencies due to losses of heat from the resistor ends passing out from the interior of the furnace. Nevertheless, carbon in one form or another is practically the only solid resistor material suitable for temperatures above, say, 1,200 deg. C. The maximum temperature conveniently attainable with carbon resistors is in the region of 2,500 deg. C.

The Morgan Crucible Co. has recently introduced a heating element for radiation heating at temperatures up to 1,250 deg. C. It consists of a long slab of carbonaceous material protected from oxidation by a thin covering glaze of refractory material. Furnaces heated by this element are being successfully used for, amongst other purposes, the firing of pottery at 1,100 deg. C. When this process is carried out with coal heating, the rejections of finished ware, due to fouling, &c., amount to 3 per cent. With electrical heating this figure falls to a fraction of 1 per cent. and the saving thus realised more than covers the cost of the electrical energy consumed at 1d. per kWh. Further, the cost of renewing the electrical elements is less than the cost of saggars used in coal-fired kilns.

The Ajax Electrothermic Corporation, of Trenton, U.S.A., has recently developed furnaces with loadings up to 100 kVA and capacities of 600 lb. The power factor of the furnace is naturally low, but is corrected by the use of condensers. Since the induced currents flow mainly in the outer layers of the metal, the choice of frequency is determined by the internal diameter of the charged crucible and also by the resistivity of the charge; it varies from 500 to 1,000,000 cycles. The most difficult metals to fuse, such as tungsten, can be readily melted by this process, and the Gutta Percha Co. has installed at Bilston, near Wolverhampton, a high-frequency induction-furnace plant consisting of 42 units, each of 35 to 40 kVA capacity for dealing with alloys of critical composition where the freedom from contamination by carbon is essential. The chief disadvantage of this process lies in the present high cost of the installation, but this will certainly be lowered with an increased demand for high-frequency generators.

It has been said that the prosperity of a country may be measured in terms of steel and sulphuric acid. But even in a highly industrialised community such as Great Britain agriculture will continue to be a most important industry, and the nitrogen-fixation industry should be held to rank in importance with those of steel and sulphuric acid. For synthetising compounds from atmospheric nitrogen there are two methods in use in which electrothermics play a leading role. By one method nitrogen is directly oxidised in a high-pressure arc discharge; in the other calcium cyanamide is formed by the interaction of nitrogen and calcium carbide, the latter being the product of one of the first electro-thermic processes to be successfully established on a large scale.

To-day the largest proportion of calcium carbide is manufactured in continuous tapping furnaces, of which the Alby furnace may be quoted as a typical example, this being fitted with a tapping spout through which the carbide is run off in a molten state at regular intervals. The walls of the furnace are lined with refractory material and the bottom with a bed of compressed mixture of tar and electrode carbon, making intimate electrical contact with a steel grating to which one lead of the electric supply is connected. The smaller units employ single-phase current and have a bundle of four or five vertical carbon electrodes of square cross section clamped together in parallel in the supply. The largest tapping furnaces of the Halfenstein type have no hearth electrode, and take up to 12,000 kVA at a power factor of 0.85 to three vertical electrodes. The furnace efficiency is over 60 per cent., about 4,000 kW-hours being required to produce one ton of carbide. In all carbide furnaces the charge is heated by a smothered l.p. arc.

Electrode consumption is an important item, and in the carbide industry accounts for about 10 per cent. of the total production costs in the manufacture of calcium carbide. Despite several advantages the high cost of graphite often renders its use prohibitive and carbon has to be substituted. The Soderberg electrode is a continuous self-baking electrode consisting of sections of sheet-steel tubing, fitted together as required, into which unbaked electrode material is rammed or even simply poured. The mixture is baked by the waste heat of the furnace, the gases escaping through perforations in the steel tubing. The tubes are fitted with radial fins or ribs, directed inwards, which serve to hold the baked section of the mixture and increase the area of electrical contact between the latter and the steel tubing. Since the conductivity of the "green" mixture of the electrode is very low, most of the current in the cooler sections is carried by the steel tubing and fins. As the electrode descends into the furnace, more and more of the current flows through the mixture, according to the degree to which the latter has been baked. The steel tubing melts away a short distance above the furnace end of the electrode, leaving the completely baked electrode mass free.

The advantages claimed are that the consumer makes his own electrodes, and is therefore independent of the electrode manufacturer. The necessary anthracite calcining, grinding, and mixing plant for preparing the green electrode mixture is robust, simple and easily run. Calcining is carried out in a continuous smothered arc-heated kiln. Electrode consumption is reduced owing to the complete absence of butts, and breakages and to the high degree of density of the baked mass, due to the fact that baking goes on under the pressure of the weight of the upper unbaked contents of the electrode. Further, the electrode is well protected against oxidation. Economies in electrode consumption costs varying from 50 to 80 per cent. have been reported in favour of the Soderberg electrode. The maximum current density permissible is high, exceeding 12 A per sq. cm., and the largest Soderberg electrode at present in use is 83 in. in diameter. A carbide or ferro-silicon furnace with Soderberg electrodes can be operated continuously at full load with no stoppage for changing the electrodes, as a fresh section of tube is fitted to the end of the electrode protruding from the furnace, and is filled with fresh electrode mixture. Soderberg electrodes taking over 350,000 kW are said to be in use in Europe, the United States, Japan, and in the Dominions.

The essential distinguishing features of the various nitrogen-fixation arc processes in successful operation to-day lie chiefly in the nature of the arc furnaces employed. There are six such different types of furnace—the Birkeland-Eyde, the Pauling, the Schonherr, the Moscicki, the Guye, and the Wielogaski. The first three all make use of h.p. arcs in which the rate of dissipation of energy is exceedingly high. The short l.p. arc cannot be employed, as it would not be possible to pass air at a sufficient rate through such an arc, and the high concentration of electrode vapours would accelerate the decomposition of any nitric oxide formed and result in a poor yield. Whilst the general efficiency of the Schonherr furnace is much the same as that of the Birkeland-Eyde and the Pauling, the nitric concentration is considerably higher, averaging as much as 1.8 per cent. of nitric oxide. That this is so, despite the fact that the gases only pass slowly along and through the arc, is strong evidence that the oxidation of nitrogen in the high-pressure arc is primarily an electrical process. The efficiency of the three types of furnace are much on the same level, although the Schonherr furnace undoubtedly yields the richest gas. From the point of view of first cost, the Pauling furnace is the cheapest and the Birkeland-Eyde the most expensive. On the whole, however, the latter was said to be the most successful, doubtless due to the fact that single Birkeland-Eyde units can be built to take, and be operated successfully under the enormous load of 5,000 kW, whereas the practical upper load limit of the Schonherr furnace is about 1,000 kW, and somewhat lower in the case of the twin-series Pauling furnace.

The electrical manufacture of steel may be divided into two stages—the electrothermic smelting of iron ores for pig-iron, and the electrothermic production of steels from pig-

iron and steel. Whether or not the electrothermal process can compete with the purely thermal process is largely a question of the relative costs of electricity and fuel. It has been calculated that the two processes will be on a par when the cost of 1 kW-year is equal to that of 3.1 tons of coke, *i.e.*, when 1 calorie can be generated electrically at a cost equivalent to only 3.3 fuel-produced calories. It is clear that this will be the case only in countries where fuel is scarce and electrical power cheap. At present the electric smelting of iron-ore is practically confined to Scandinavia and, to a lesser extent, California. In the former country, where the conditions are most favourable, the electrothermal production of pig-iron has advanced rapidly and now ranks as a leading industry. In the case of steel-making, however, the question of relative fuel and electricity costs are of far less importance, and the electrothermal production of steel is now well established as an important industry in most civilised countries. In electrothermal steel-making steels of any desired quality can be produced from either pure or impure materials.

The electrothermal refining of pig-iron is seldom carried out, the molten pig-iron being either first partially refined in a Bessemer converter, or in an open-hearth furnace with an oxidising slag, and then finished in an electric furnace with a basic reducing slag (duplex process); or the molten pig-iron is first blown in a Bessemer converter, then further refined in an open-hearth furnace and finally finished in an electric furnace (triplex process).

In America the electric furnace is widely used in conjunction with the Bessemer converter or the open-hearth furnace, or both, for the production of high-class rail-steel and steel for constructional and shipbuilding purposes from pig-iron of large phosphorus content. In this country the electric steel furnace is employed almost solely for the melting-up of high-grade scrap steel; refining is not carried out. The two chief uses to which the electric furnace is put are to melt pure materials to steel of crucible quality, and to refine Bessemer open-hearth or scrap steel of similar quality to steel of crucible quality.

The mechanism of the electrothermal production of steel from pure materials is relatively simple and resembles that of the crucible steel process. Scrap steel of suitably low-sulphur and phosphorus content is melted down in the electric furnace, and the carbon content is adjusted by additions of pure high-carbon iron and pure iron-ore, or better, low-carbon scrap. After melting, the charge is kept molten in order to enable occluded oxides and gases to escape to the surface. The reducing atmosphere and the high temperatures attainable render the electric furnace particularly suitable for the making of alloy steels, as the loss of costly alloying elements is low, and it is easy to incorporate in the steel difficultly fusible metals such as tungsten. Compared with the crucible process, the electric furnace possesses further important advantages. Operations can be carried out on a far larger scale, comparable with open-hearth treatment, and there is no risk of contamination of the steel with flue gases or the crucible material such as is liable to occur in the crucible process. The steel is at so high a temperature that it is possible to make intricate castings with a minimum liability to flaws. From the point of view of thermal efficiency, the advantage is overwhelmingly in favour of the electric furnace with its intense and localised heat production. Starting with cold materials, the energy consumption in the electric furnace amounts to about 500 to 600 kWh per ton of finished steel, equivalent to about 430,000 to 516,000 calories (electrically produced), as compared with 1½ to 2 tons of coke, equivalent to, say, 12,000,000 to 16,000,000 calories (fuel produced) per ton of steel made by the crucible process.

In this country the cost of generating electricity is so high that, in order to be on the safe side, it is necessary to put the cost of 1 calorie electrically generated at about 18 calories produced from fuel. Thus, expressed in terms of fuel-produced heat, the cost of making 1 ton of steel from cold scrap in an electric furnace lies between 7,740,000 and 9,288,000 calories, as against 12,000,000 to 16,000,000 calories required per ton of steel made by the crucible process. It is clear that on economic grounds alone the crucible process is to be considered as wasteful. The superb skill of the crucible steel-maker is worthy of a better tool than the scientifically unsound crucible. This is available in the shape of either the high-frequency electric furnace for the production of steels of the highest grades in small batches, or the arc furnace for larger batches of steel of, or even excelling, crucible quality. The electric furnace must have a basic lining, for the removal of phosphorous involves the use of an oxidising basic slag produced by the addition of iron-ore and lime. The high temperature attainable in the electric furnace permits of the use of extremely limey slags, thus ensuring a rapid and complete removal of the sulphur. Slags of similar basicity could not be employed in the open-hearth furnace owing to their viscosity at the relatively much lower temperatures of such furnaces. The frequently observed formation of $CaO_2$ in the electric steel furnace bears witness to the existence of the high temperatures and the reducing atmosphere so essential to the successful carrying out of this second stage of the process. Upon removal of the second slag, the steel is "killed," recarburised and alloyed. The resulting product is, in quality, fully equal, or even superior, to crucible steel, and certainly exceeds the latter in uniformity over large batches.

From the foregoing it is clear that pig-iron can be refined in the electric furnace to a steel of the highest quality. On economic grounds, however, this is seldom done. The refining of molten pig-iron, to which has been added the necessary quantity of cold iron ore, to open-hearth steel in an electric furnace calls for an expenditure of about 200 kWh per ton of steel. The further refining of this molten open-hearth quality steel to crucible steel requires only about 80 kWh. In an open-hearth furnace a ton of steel is produced with an average expenditure of about 6 cwt. of fuel or, say, about 450,000 fuel-produced calories, as against, say, $200 \times 860 = 172,000$ electrically-produced calories.

With regard to the future prospects of electrothermics in this country, there is ample opportunity for the improvement of the processes. The furnace and process efficiencies can be improved, and the concentration of nitric oxide contained in the arc gases can also be increased very considerably. It is not a question of the relative cost of water-power-generated and fuel-generated electricity. The disparity between the two is by no means so great as is sometimes thought. There are many water-power-generated supplies in Switzerland which are much more expensive than the average run of coal-generated electricity in this country. We have to consider that whereas coal-generated electricity is usually available precisely where it is wanted, water-generated current is usually remote from its markets. In comparing the cost of fuel-generated and water-power-generated electricity we must not forget the important item of transport of material to the site of the water power, and the transport of the products from that site to their markets.

In the future the engineer and the chemist will co-operate rather more than they have been inclined to do up to the present. The chemist has a great deal to do in the way of improving his processes, but he will turn to the electrical engineer and ask him to improve, for instance, his means of transmission. The day may come when it will be possible to import electricity into this country from other countries, such as Norway, Iceland, and perhaps even Canada. It is simply a question of the relative cost of transport of the goods made in Canada to this local market and of the transmission of electricity.

# Trolley 'Bus Operation.

## An Automatic Centrifugal Governor Switch Designed for Field Shunting at a Predetermined Speed.

IN 1922 the Associated Daimler Co., Ltd. (then the A.E.C.), first tackled the problem of the trolley 'bus built on automobile lines, and had of necessity to fit a standard tramway motor. It was decided to equip the vehicle with a single motor, with rheostatic control, which gave a 'bus speed of 14 m.p.h. with full field, but 18 m.p.h. could be obtained by shunting 50 per cent. of the field current. To put this advantage of extra speed in the hands of the driver meant the possible risk of burning out the motor by overloading, and it was decided to perform the function automatically. A centri-

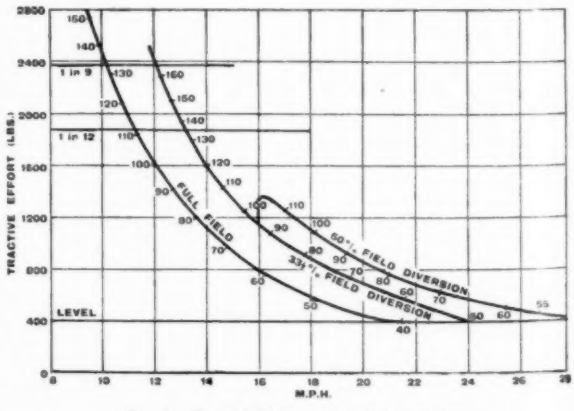



Fig. 1.—Road Performance of Trolley 'Buses.

fugal governor switch was designed to effect the shunting at a predetermined speed when the motor was not overloaded and when the acceleration of the motor was beginning to fall off. This had the desired effect of increasing the speed range and improving the acceleration of the 'bus without risk. The next step in the improvement of the trolley 'bus was the development of the lightweight motor of about 21 lb. per h.p., which was designed to run at higher speeds and with a characteristic giving higher speeds for the lighter loads, giving a greater road-speed range with a full field.

At first sight this would appear to curtail the usefulness of the governor device, especially as the new motors were capable of operating satisfactorily at all loads with 33⅓ per cent. field current shunted. The governor, however, can still further increase the speed by cutting in later and shunting the field current up to 50 per cent. The accompanying curve, fig. 1, shows the road performance of some trolley 'buses recently supplied by the A.D.C. to the Bradford Corporation. The maximum speed on the level at full load and with full field is 21¼ m.p.h., and with 33⅓ per cent. field shunting the speed is nearly 24 m.p.h. These speeds are actuated through the controller and are under the control of the driver. When the vehicle reaches 16 m.p.h., the governor cuts in and increases the amount of field current shunted to 50 per cent., and thus

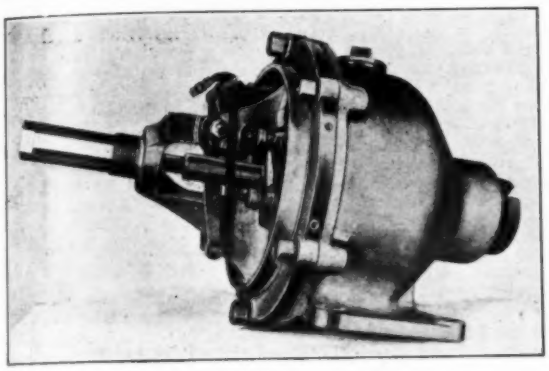


Fig. 2.—Trolley 'Bus Governor Device.

increases the speed to 28 m.p.h. During some road tests made recently at Bradford, it was found that the performance not only checked up with the curve, but that the acceleration was appreciably improved, and that the cutting in of the governor was hardly noticed. When the 'bus was lightly loaded it was found that on the worst gradient, about 1 in 13, the 'bus was 16 per cent. faster than when the governor was disconnected. With heavy loads the speed would not reach 16 m.p.h., and, therefore, the governor would not cut in and overload the motor. The governor can be switched off quite simply if desired by a 10-A switch, so that in cases where traffic conditions do not allow of extra speed it can be cut out until more suitable conditions obtain. Fig. 2 shows the governor device. The centrifugal portion follows the usual form of construction of expanding weights controlled by springs acting through levers on a push rod passing up the centre of the case. This rod in turn operates a quick break switch. The current controlled by this switch is about ½-A at 500 V, and closes a contactor which cuts in the 5 per cent. shunt resistance.

# Parliamentary News.

**(By Our Special Parliamentary Reporter.)**

### County of London Electric Supply Co. Bill.

A Committee of the House of Commons (presided over by Sir John Ganzoni) commenced consideration of this Bill on May 9th. The main purpose of the Bill is to extend the company's area of supply to include the greater part of the county of Essex. It also proposes to confer further powers on the company with regard to its existing area of supply. There was opposition from the Colchester and Southend-on-Sea Corporations, Clacton and Shoeburyness Urban District Councils, the Essex County Council, and the Lea Conservancy Board.

Mr. W. E. TYLDESLEY JONES, K.C. (who appeared with Mr. Rowand Harker, K.C., and Mr. S. Turner, for the company), said that the company's Barking station was in a position to give a supply to the whole of the area. The proposal of the Bill was that the company should be allowed to supply in the greater part of the county, but where in any district there were authorised undertakers it should only be allowed to supply in bulk to those undertakers. At present the Southend Corporation had three generating stations, in which it used Diesel engines, and there was no question that it would have to get rid of these and embark on a new scheme. If the Bill were passed, the company would be able to supply electricity to Southend on terms better than those on which the Corporation could itself generate, and, in addition, electricity could be supplied in sparsely-populated parts of the county by means of the cable used for supplying Southend. It was provided that if, at the time of the company's application for the present Bill, other people had already made applications for Orders enabling them to supply in parts of the area and if those Orders were subsequently granted, the promoters were to be in the same position as if the Orders had been granted at the date of the passing of the present Bill. Several months after the company had given notice of the deposit of the Bill, the local authorities at Southend, Colchester and Clacton had applied for powers to supply in parts of Essex not supplied at present, and they were going to ask the Committee to extend the clause and to place them in the same position as that in which they would be if they had powers at the date of the passing of the Bill. A clause was inserted in the Bill making the undertaking purchasable at the end of 50 years by the local authorities. Another clause empowered the Electricity Commissioners to make an Order after the expiration of seven years, limiting dividends in relation to charges. There was also a clause providing that within two years from the passing of the Bill the company was to submit to the Electricity Commissioners a scheme for the development of electricity supply in parts of the area in which there was a demand for it. Subsequently such schemes were to be submitted to the Commissioners every five years, until the whole area was covered. If within the period prescribed by the Commissioners for carrying out the proposals approved by them, the company had not substantially commenced the works for the purpose of giving effect to the proposals, the Minister of Transport could order that the company's powers should cease as to the whole or any part of the added area comprised in the proposals. It was also provided that if applications were made or supported by the local authorities for powers to supply in any parts of the company's added area in which the company was not supplying, the company was not to oppose unless the applicants asked for power to erect, acquire, or use a generating station. An important difference between the company's 1924 Bill and the present Bill was that the former proposed to confer upon the company powers of a power company, whereas those powers were not sought in the present Bill. There was a clause, giving the company power to transfer any of its undertakings outside London to another company, with the approval of the Electricity Commissioners. Counsel explained that that was necessary on account of the special position of the London undertakings. It might be found desirable to vest the company's undertakings outside the County of London in a separate company, which would keep separate accounts, and so avoid the difficulties involved in making adjustments. The London and Home Counties Joint Electricity Authority was not deprived of any right exercisable by it at the date of the passing of this Bill to supply electricity in bulk in any part of the added area which was within its jurisdiction, and the consent of the company to any such supply was not necessary. Counsel then dealt briefly with the petitions against the Bill. He said that that of the Essex County Council related to the breaking up of roads, bridges, &c. The Southend Corporation was asking the Committee not to grant the powers which the company asked for, not only as regarded its own area, but also as regarded the whole of Essex. The Clacton U.D.C. raised the same kind of objection. The Colchester Corporation was trying to do on a small scale what the company proposed to do on a large scale. The erection of a small station by the Corporation was nearly complete, but it could not compete with Barking. There was no appearance on the petition of the Shoeburyness U.D.C., and that of the Lea Conservancy Board was left to be dealt with when the clauses of the Bill were finally settled.

Mr. C. H. MERZ stated that the company had laid 300 miles of mains, 100 miles of which were in the County of Essex.

On May 10th, Mr. Merz was cross-examined by Mr. Ralph Bury (on behalf of the Essex County Council), and said that the offers made by the company in connection with the company's 1924 Bill, to supply in Chelmsford within two years and in Epping within three years, were not repeated now, because conditions had changed by the fact that the Central Electricity Board was now preparing schemes; any arrangements of this nature with individual authorities could quite conceivably conflict with schemes prepared by the Board.

Sir HARRY RENWICK (chairman of the company) said with regard to the clause in the Bill to empower the company to transfer that part of its undertaking which was outside London, that the Commissioners could be trusted to ensure that the terms of transfer were fair and proper.

Sir LYNDEN MACASSEY, K.C., cross-examining on behalf of the Southend Corporation, asked why the company should put forward a scheme for dealing with Essex before the county had been considered by the Commissioners and the Board. Sir Harry replied that the scheme could only be carried out after it had received the approval of the Commissioners. If they waited until the Commissioners or the Board brought up a scheme to deal with a rural county such as Essex, he was afraid they would have to wait a long time. Before promoting the Bill he had consulted the Commissioners, and the Bill was largely framed on the advice given by them.

Mr. JACQUES ABADY cross-examined on behalf of the Clacton U.D.C. After securing the admission that, if this Bill were not passed, the company could apply for a Special Order to cover the whole of the added area, he pointed out that if the company did apply for a Special Order, that Order would include, as was always the case, the Section of the Electric Lighting (Clauses) Act which placed undertakers under an obligation to supply in certain districts within specified periods.

On Wednesday, May 11th, Mr. H. HOBSON (joint manager of the County of London Co.) gave evidence with regard to the

details of the negotiations between the Company and the Southend Corporation for a bulk supply to the latter. An offer from the County of London Company for a bulk supply to the Corporation, based on conditions imposed by the latter, was not accepted. Subsequently a further offer of a bulk supply was made to the Corporation, but had neither been refused nor accepted. The erection of a generating station on the River Crouch would have necessitated a capital expenditure by the Corporation of £649,000, and the estimated cost of operation, including loan charges on the capital, was £174,615 per annum. Mr. Rider had reported that, carrying the comparison to the year 1930, the adoption of the bulk supply scheme would result in an apparent annual saving of £8,475, but if the comparison were carried to 1940, the advantage would be with local generation.

Mr. F. G. Thomas, K.C., for Colchester Corporation, said that rights of the character asked for should not be given without imposing definite obligations. In 1925, the Colchester Corporation had commenced the erection of a new generating station, but as the work had not proceeded very far, the formal application to the Commissioners for powers to supply in outside districts was not lodged until December of last year. Dealing with the clause under which the company was to submit schemes to the Electricity Commissioners for the development of the various parts of the new area from time to time, he pointed out that its effect was to leave the company, and not the Commissioners, to judge what work should be carried out.

Mr. W. C. C. Hawtayne gave particulars of the costs of the Colchester station designed to show that if electricity were obtained in bulk from the company, it would cost the Corporation more than if it were generated locally.

On May 12th, Mr. Hawtayne said that Colchester had no objection to the company's having distribution powers over the whole of that part of the county which Colchester did not want. Witness said that if the local authority at Wivenhoe wished to become the authorised distributor in its own area the Colchester Corporation would not seek distribution powers there but would supply in bulk. Arrangements were already made for that bulk supply. Negotiations were also in hand for a bulk supply to Brightlingsea. Witness quoted figures of costs for Colchester and Barking, but Mr. Harker contended that he had compared the figure of £26 5s. representing the capital cost per kVA installed at Colchester with the figure of £20 2s. representing the capital cost per kW of output at Barking.

Mr. Jacques Abady, for the Clacton U.D.C., said that although his clients had only a small station, generally speaking they were supplying electricity at a lower rate than that at which the County of London Co. supplied. If the development of the district was entrusted to the County of London Co., it should be through the medium of a Special Order, which would give the local authorities an opportunity to make representations and secure protection. The clause prohibiting the company from opposing any application made or supported by a local authority for an Order, unless the Order applied for included power to erect, acquire or use a generating station, would force such applicants to take a bulk supply from the company.

Mr. G. Broadhurst (electrical engineer to the Clacton U.D.C.) gave evidence to support Mr. Abady's statement, and spoke of the intended developments. He was of opinion that the Clacton station would continue to work for many years.

The hearing was continued on subsequent days and the Committee passed the Bill on Tuesday.

### East Anglian Electricity Bill.

A Committee of the House of Commons presided over by Sir A. Shirley Benn on May 10th, began consideration of this Bill. The promoters are the East Anglian Electric Supply Co., who are asking for powers to supply electricity in the counties of Norfolk and Suffolk. There are 11 opponents to the Bill, the principal being the Norwich, Ipswich, Great Yarmouth, and Bury St. Edmunds Corporations.

Mr. H. P. MacMillan, K.C., who appeared for the promoters, said the company had a Special Order for an area in the southern part of Suffolk, bordering on Essex, and including a small part of Essex. It had the backing of the Greater London and Counties Trust, which had a controlling interest. Originally, the Bill included a large portion of the county of Essex, but as the County of London Electric Supply Co. had promoted a Bill which included Essex, the whole of Essex had been cut out of the Bill. The Ministry of Transport now offered no objection to the principle of the Bill. It had been said that the position of some of the authorised distributors in the area would be prejudiced, as a few of them were applying for extensions of their areas. The promoters, however, were willing to concede that those additional areas, if granted, should not be supplied by the promoters without consent, and the same provision was made to apply to any application for an increase of area by an existing authorised distributor made before the date of passing of the Bill. In addition, the promoters had included a clause providing that if after the end of three years from the passing of the Act, applications were made for Orders to supply in any part of the area, the promoters would not oppose. The promoters were compelled every three years, or more often if required by the Electricity Commissioners, to prepare schemes for dealing with areas not supplied in which a demand arose. Any Order made by the Commissioners in those circumstances would make it obligatory upon the company to give a supply within two years. A definite scheme might conflict with subsequent schemes of the Central Electricity Board. The Bill did not provide for a new generating station; it was hoped that bulk supplies would be available from large generating stations.

Mr. B. G. Drummond, general manager and director of the company, said that the policy of the company was to develop the rural demand. Before the Bill was promoted the Commissioners had stated that there was no necessity to make provision for a generating station in the Bill, because it would be the duty of the Central Electricity Board to supply the necessary energy. Should supply be required before these arrangements were made, supplies would be available from the Norwich, Yarmouth, or Ipswich Corporations, or from the North Metropolitan Electric Power Supply Co., and the Bedfordshire, Cambridgeshire, and Huntingdon Electric Supply Co. A clause enabled the company to take and give bulk supplies, and a scheme had been prepared involving a capital expenditure of just under £500,000 for mains. Mr. Craig Henderson, for the promoters, said that in order to meet a point raised by the chairman the Bill would be amended so that the first proposals should be put before the Commissioners within 12 months of the passing of the Bill.

Mr. William May (director of the Greater London and Counties Trust) said that the Trust was formed by some of his American friends to acquire interests in electricity and other public utility undertakings. The Trust was prepared to find £500,000 or more for the purposes of the promoters of the Bill. They would expect a 10 per cent. return on the capital, and they were satisfied that electricity could be profitably developed in the area.

On May 11th, Mr. F. M. Rogers, chairman of the company, and managing director of the Greater London and Counties Trust, Ltd., said that the Trust obtained control of the East Anglian Co. in March, 1926, and since then £15,000 had been found for extensions of the company's business, whilst a further expenditure of £30,000 was contemplated immediately. Any additional capital required would be provided by the Trust. Sir Philip Dawson was chairman of the Trust, and the new capital required would be found by American financiers. During the first year, if the Bill passed, the expenditure would amount to at least £150,000. The £30,000 was required for a trunk main between Braintree in Essex and Sudbury in Suffolk in order to give a more effective supply there. A scheme for carrying h.p. mains throughout the area had been prepared, and although Mr. May had stated that a return of 10 per cent. was anticipated, that would not be possible for a number of years. Mr. Wrottesley, K.C., said that the company would merely be distributing the current taken in bulk from the local authorities at a higher price than the local authorities could supply it. The profits of the company were not limited under the Bill. Mr. MacMillan, K.C., for the promoters, said that the Minister of Transport had suggested a sliding scale, and the promoters were considering that. Clause 16 of the Bill provided for the revision of prices. He also said that the Trust was not associated with any American or other manufacturing firm, so that there was no danger of orders going to America. Mr. Spencer Hawes said that the company's position must be regularised by being changed to a statutory one, otherwise capital could not be raised for extensions. It was the intention, if the Bill passed, to close down most of the local stations and take bulk supplies. The company undertook to prepare a scheme within one year, and to carry it out within two years. The company was prepared to erect a power house if the Commissioners decided that one should be constructed. Mr. Wrottesley commented on the fact that no inquiries had been made concerning the prospects of the area as a whole, and suggested that they should have been made before coming to Parliament. Mr. Hawes replied that the evidence was that supply was being given profitably in a large number of districts by the company under non-statutory conditions. The Bill had the same effect as if it were a Special Order as recommended by the Minister of Transport. The fear that the transmission cables from the Central Board in East Anglia would be in the hands of the company was removed by the fact that the Central Board could, if it thought fit, take over those mains.

Local evidence in support of the Bill was then called and the case for the promoters was closed.

On Thursday, May 12th, Mr. Wrottesley said that the promoting company would not generate electricity, and would be merely in the position of middleman between those who generated electricity in the area and those who used it, which could not be in the interests of the consumers. Looked upon as a power scheme the Bill was unnecessary, whilst the rough outline of a scheme of h.p. mains which had been suggested was premature because it was not based upon any inquiries as to the probable demand.

Mr. F. G. Thomas, K.C., for Stowmarket U.D.C. and some rural district councils, said that under the Bill it was left to the promoters to submit schemes to the Electricity Commissioners, and there was no means of compelling the promoters to put forward a scheme for the whole of the area.

The Chairman said that the Committee, having heard the evidence, was inclined to approve the preamble subject to certain conditions, but it was not satisfied that the financial resources of the company were sufficiently strong at the present time to justify such a large area being entrusted to it. He accordingly adjourned the hearing until the following day to give the promoters an opportunity to confer on the matter.

Mr. MACMILLAN, K.C., for the promoters, referring to the decision on the previous day, said that the Bill would not have been placed before the Committee had it not had behind it the support of the Greater London and Counties Trust, Ltd. That concern was prepared to enter into a contract forthwith with the company, to the effect that in the event of the Bill being passed the Trust would subscribe further ordinary shares to the amount of £150,000 at least for developing the area, and if so desired the contract would be produced to the Committee before the Bill was passed.

Mr. F. G. THOMAS, K.C., argued that if, after the Bill was passed, investigations showed that the area, or large portions of it, would not be remunerative there was nothing to prevent the contract being annulled. Mr. MACMILLAN reminded the Committee that the promoters had to submit proposals within a year, and if they were not carried out the powers under the Bill could be revoked within two years. Mr. THOMAS replied that to meet that obligation it would be necessary for the East Anglian Co. only to provide a scheme for an infinitesimal portion of the area.

The CHAIRMAN announced that the Committee would like to examine the proposed contract between the Trust and the East Anglian Co., and also that it was proposed to put in, as one of the conditions of passing the Bill, an obligation that the company should, within 12 months of the passing of the Act, submit to the Electricity Commissioners a general scheme of transmission throughout the whole area, costing not less than the £500,000 that had been mentioned during the proceedings. In order to give the promoters an opportunity of going into those matters the Committee adjourned until May 19th.

### Electricity Schemes.

On May 10th, during a debate on the Ministry of Transport vote, Col. ASHLEY said that the Central Electricity Board had already received one scheme from the Electricity Commissioners, the Scottish scheme, and the scheme for Central England was in an advanced state of preparation and would be ready almost at once. There were two other schemes that were being investigated and that would in a few months come before the Central Electricity Board. The investigations with regard to the Severn barrage had reached a stage in which considerable hopes were raised that it would be a success.

Lt.-Col. MOORE-BRABAZON said that the cost of the Severn scheme would be about £8,000,000. It was said that whether it would ever prove a commercial success would depend entirely on the price of coal. If in future coal were to be more than 17s. a ton the scheme would be a commercial success.

Mr. T. WILLIAMS complained of the attitude of the Electricity Commissioners in refusing to sanction an application by the Mexborough Urban District Council for sanction for a loan under Section 11 of the Electricity Supply Act, 1919. The effect of that refusal was to place the Council in the unfortunate position of having to pay a much higher price for the purchase of power from the Yorkshire Electric Power Company. If the Minister concurred in such decisions of the Electricity Commissioners, it would mean that the small but highly efficient generating plants in the country were going to be handed over to the big electricity companies without any compensation.

Mr. ATTLEE expressed himself as strongly in favour of the concentration of generation in capital stations, but said that some of the big companies had taken very short-sighted and narrow views. They did not offer sufficiently attractive terms for bulk supply, and their attitude was militating against the success of the 1926 scheme. If the Minister approved of the reduction of the period for loan charges from 15 years to 10, he was not really benefiting the progress of schemes under the 1926 Act, but he was really weakening the bargaining power of local authorities and small supply companies to get reasonable terms of bulk supply from the big power companies.

Col. ASHLEY said that he could not interfere with the finding of the Electricity Commissioners regarding Mexborough. His information was that the Yorkshire Power Co. would be able to supply current cheaper than the Corporation.

### The Mexborough Case.

On May 10th, Mr. T. WILLIAMS again raised the question of the Mexborough case. He asked if the Minister of Transport was aware that the Commissioners had based their calculations upon repayment of the necessary loan over a period of 10 years instead of the usual period of 20 years; that the facts were such that, without having halved the period of repayment of the loan, the saving was in favour of local generation, and if he would have the case reconsidered.

Col. ASHLEY said that it was the practice of the Electricity Commissioners to allow a period of less than 20 years for the repayment of loans for generating plant in cases where there was reason to anticipate that the utility of such plant might be superseded owing to the probability of bulk supply or other circumstances. Mexborough was in a provisionally determined electricity district, and he was not prepared to ask the Commissioners to reconsider their decision.

### Electricity Loan Periods.

On May 10th Mr. T. WILLIAMS asked the Minister of Transport if he would state in how many cases, where a local authority had made application to the Electricity Commissioners to extend its plant, the period for repayment of loan had been calculated on the basis of 10 years; and whether, in view of Clause 14 of the Electricity (Supply) Act, 1926, he would state why that new basis was used.

Col. ASHLEY said there were three cases where the Electricity Commissioners had adopted 10 years as the appropriate period, and that in a number of other cases the calculations were being made on the same basis. It had been the practice of the Electricity Commissioners since 1920 to prescribe a period less than 20 years for the repayment of such loans where there was reason to anticipate that for any special reason the plant might be superseded during a shorter period.

# Correspondence.

***Correspondents should forward their communications as early as possible.*** *No letter can be published unless we have the writer's name and address in our possession.*

### The Ordinary Engineer and the Beama.

In my recent article on "The Ordinary Engineer and his Remuneration," I expressed the opinion that the subject of vital interest to the "ordinary engineer" is his salary. That is the touchstone with which he tests the various aspects of the industry which affect him. I do not suggest that his views are so narrow that he can only examine the immediate effects of any of these aspects upon his own position, but I do affirm that while he may view them in their correct perspective with regard to their effect on the industry as a whole, their main interest is, to him, how they affect him financially.

The Beama is, of course, the great hush-hush of the electrical industry, and it is a striking testimony to the integrity of the profession that it has escaped criticism for so many years. It was on this account that I refrained from referring to it in the article already mentioned above. Even now, although employed by a firm not in the Beama, I feel myself bound to some extent by the confidence reposed in me by previous employers who were members of it. Since, however, the Association has recently come into the limelight and has been defended by Mr. D. N. Dunlop and others, I feel myself at liberty to make some comments.

Speaking for the "ordinary engineer," I believe that the Beama, like the trade union, is a necessary institution. Like the trade union, I believe it has overshot its mark. Speaking from personal experience, I beg leave to doubt that Beama prices are seldom in excess of the prices which would be charged by the individual firms.

One of the great arguments of the Beama defenders is that it enables them to pay higher wages—and presumably salaries. The fact is that it is hardly possible for them to be lower—moreover, the wages paid by Beama firms are at trade union rates, just as are those paid by firms outside the ring. Salaries are higher, if anything, outside the ring than in it. Taking into account the index figure of the cost of living (published by the Board of Trade) salaries are lower to-day than ever before—lower even than in those dark days before the Beama saw the light of day. I do not deny that shareholders—and probably directors—have benefited by its birth, but I do deny emphatically that the benefits accruing to Beama firms are passed on in any way to the engineering staffs. For instance, since it has been admitted that the Association controls prices and distributes work, let it also be admitted that in very many cases—if not all—unsuccessful tenderers are reimbursed for their quoting expenses by the firm which obtains the contract. These bonuses are very considerable amounts and far in excess of the actual expenses of tendering. They are, nominally, to pay the costs of the engineering and sales staffs. I would like to hear from *any* Beama firm that it sets aside any proportion of such bonuses to augment the salaries of its staff. I should like to hear a denial that such sums are simply thrown into the general account for the ultimate benefit of shareholders—and directors.

We have all of us experienced that threadbare cry of "bad times" as an excuse for unjustifiable parsimony in the matter of salary increases. I should go weak at the knees and goosey all over if I heard of any engineering firm—Beama or otherwise—whose directors said to the engineering staff: "Gentlemen, we have had a jolly good year, and in so far as our success is largely due to the engineering staff, we have pleasure in raising your salaries 10 per cent. all round, so that you can eat butter instead of margarine and have meat three times a week instead of twice."

In conclusion, I throw down a definite challenge to any Beama firm, to show that they have given a definite percentage increase to their engineering staff in the same way that they give a definite percentage dividend to their shareholders.

P. B. E.

*May 11th, 1927.*

### The Bogy of 40.

In your "Situations Vacant" columns for the 29th ult., I noticed an advertisement inviting applications from experienced men who have specialised in commercial work, "Age not over 35," and I am tempted to ask why some employers,

especially those belonging to the electricity supply profession, should consider a man of over 35 years inferior in ability and efficiency to a younger man.

I am 45, and feel that my mental capabilities and powers of concentration and application were never so pronounced as at the present moment, whilst those extra ten years have taught me much more than I ever knew when I was 35.

Let us explode this "40 bogy" once for all. If a chief engineer of 65 is capable of conducting a supply undertaking, he is entitled to draw his £1,000 per year, but need it tax his sense of proportion or charity to suggest that his assistants of 40 and 45 are equally worth their £6 or £8 per week?

*May 11th, 1927.* **Live and Let Live.**

### Sheath Losses in Cables.

All workers in this field will be grateful to Mr. Brockbank for bringing to notice the ingenious and simple method for measuring sheath losses described in his article in your current issue. From the point of view of ease in manipulation and rapidity in carrying out a number of tests the method will certainly commend itself for single-phase work, and if only the author can develop a simple adaptation for use with 3-phase currents on three single-core cables laid side by side he will deserve our further thanks.

Mr. Brockbank gives only one example of the application of the method, and in this he shows that the sheath losses in a short length of 66-kV single-core lead-covered cable with 6 in. between centres amount to 28 per cent. of the copper loss. As so much interest is being displayed in 66-kV cables just now, I think it is important to point out that the figure is not to be taken as indicating the normal sheath loss for transmission at this voltage. If the two cables (there were only two, of course, as it was a single-phase test) had been placed at 3-in. centres instead of 6 in., the value of the losses would have been considerably less than 28 per cent., and as I have shown in my recent paper before the Institution, if the three cables had been laid up close together under one armouring to form a 3-core S.L. cable the total sheath loss would have been reduced to a value less than 5 per cent. of the copper loss.

**P. Dunsheath.**

Henley Research Laboratories, Gravesend.
*May 16th, 1927.*

### Cheap Electricity.

I read with considerable interest your review of Messrs. Ruston & Hornsby's pamphlet entitled "Cheapest Electricity," but I have not seen the pamphlet yet. I have also read Mr. R. Borlase Matthews's reply to that pamphlet, and I note that he refers to a pamphlet for which I am responsible, entitled "A Word in Favour of the Independent Power Plant," and states that Messrs. Ruston & Hornsby's pamphlet is a condensed version of mine. This may or may not be correct, but I note that Mr. Matthews states that I specialise in advising on small power plants, which is, of course, correct up to a certain point, but he must disabuse his mind of the idea that the pamphlet was written with an interested motive as regards myself; it was written at the time when the Electricity Bill was under consideration, and I felt that it was desirable that the advantages of independent power plants should be recognised, and that consumers who had waste heat, either in the form of unsaleable coal, gas from coke ovens or blast furnaces, or exhaust steam, should realise that they could produce power at a very low cost by utilising this waste heat in independent plants of their own. In support of my statement I would refer to my paper on "Electric Winding Considered Practically and Commercially," read before the Institution of Electrical Engineers on January 16th, 1906, which was very fully discussed at Manchester and in London. In winding up that discussion I made the following statement:—

> "In collieries generally, particularly those in which electric winding is adopted, colliery owners would be well advised to take their current from the supply companies, assuming that they can purchase it at a reasonable price, even if this price is slightly in excess of what they can make the current for themselves; the amount of capital required for generating plant being so heavy, it can usually be applied to much greater advantage in increasing the electrical plant or improving other machinery about the collieries."

During the last twenty years it has been my lot to consider on behalf of consumers the agreements suggested by power companies for the supply of current not only for collieries, but also for iron and steel works, engineering works, and manufacturers generally, and I have endeavoured to follow the advice which I gave in my discussion; but power companies generally do not realise, or at any rate they do not admit, their inability to compete with consumers who are producing their own current from waste heat, nor do they look in a sympathetic manner at all upon the small consumer who may desire to install his own power plant in the form of a steam, oil, or gas engine, notwithstanding the fact that he can do so generally at a much lower cost in all ways, that is, as regards first cost and running cost.

In my opinion, based upon a long experience in connection with agreements, the present form of agreement adopted by many power companies is far too complicated to be understood by the ordinary consumer, who is asked to accept a maximum-demand charge and unit charge, and, in addition, a minimum payment whether he uses current or not, an adjustment if the power factor falls below a certain limit, and other penalties, which make it very difficult to arrive at what the actual cost of the current will be per unit consumed.

I have listened to the arguments of the power companies as regards the fairness or otherwise of the maximum demand plus unit basis of charging, but I fail to see why, except in very special cases, a flat-rate system of charging cannot be adopted, the charge per unit being based upon the consumption monthly or annually.

I entirely agree with the views expressed by Mr. Matthews as regards the Electricity Commissioners taking an interest in the terms of supply to consumers, and, whilst it may be necessary to add to the Commission a certain number of business men who understand the consumers' requirements and the necessity of a cheap and abundant supply, and who would be able to deal also with any disputes that might arise between the consumers and the power companies in connection with the cost of supply, it would certainly inspire a great deal of confidence in the minds of the consumers.

**W. C. Mountain.**

Newcastle-on-Tyne, *May 5th, 1927.*

### The Ideal Wiring System.

"C.T." says in your issue of the 13th inst. that "rubber sheathing is apt to crack on the outside of bends after it has been in position for some time, as rubber will do in tension." "C.T." is half correct. Some rubber sheathing may crack as he states, but C.T.S., when properly made, will not. We have dealt very thoroughly with this matter, ever since the very early days of our patent, when we discovered this fly in the ointment; and we defy "C.T." or anybody else to cause *our* C.T.S. to crack under any of the conditions mentioned by him.

"C.T." further says: "This fault is particularly noticeable in tropical climates, where great variations both in temperature and in dampness or otherwise of the atmosphere are experienced." The reply to this is as above, added to the fact that we have been sending our C.T.S. *for many years* (on the instructions of the most eminent Government and other consulting engineers) to all sorts of tropical places, mainly because it stands up to the severe conditions there which destroy other types of cable.

In conclusion, we thank you and "C.T." for giving us the opportunity of publishing this information in your widely-read columns, equally with your other contributor "C.T.S.," who has spoken so well of our "Baby."

**St. Helens Cable & Rubber Co., Ltd.**
D. EVANS, *Secretary.*

Slough, *May 13th, 1927.*

I have read with interest Mr. H. R. Taunton's article, and can only come to the conclusion that the writer is not very familiar with the advertising columns in your journal. Mr. Taunton states that "a drawback to the use of cab-tire cable is that none of its makers have provided a cheap and simple joint box for use with it—or if they have, they do not seem to be *proud* of them, for we never hear of them."

While this statement may be partly correct, it does not prevent a non-cable manufacturer from inventing and manufacturing a box for use with cab-tire cable.

For Mr. Taunton's information I would state that the majority of the leading C.M.A. manufacturers "list" and "stock" the "J.C.W." universal connector box for use with cab-tire cable.

In conclusion, I would say that I am very *proud* of this connector box, particularly in view of the numerous unsolicited testimonials I have received from users and colleges.

**J. C. White.**

Manchester, *May 14th, 1927.*

### Electro-Culture.

I beg to acknowledge my indebtedness to Mr. R. Borlase Matthews for the information he has given me on the subject. I am pursuing my investigations along the lines indicated by him.

*May 14th, 1927.* **Paisley.**

### Carnegie Awards for Gallantry.

In connection with the accident which occurred at the new works of the London Electric Supply Corporation at Deptford Dry Dock in January last, awards made by the Carnegie Hero Fund Trustees for gallantry were presented by the Mayor at a recent meeting of the Greenwich Borough Council to George Edward Thorpe, George Gaunt, John Henry Perkins, and Thomas John Taylor.

# Legal.

### Impex Electrical, Ltd., v. Norton Wireless Co., Ltd.

THIS action, which was adjourned from May 6th, came before Mr. Justice Tomlin in the Chancery Division again on May 11th. The plaintiffs claimed an injunction restraining the alleged infringement by the defendants of their trade mark "Dario" for radio valves.

Mr. COURTNEY TERRELL further cross-examined Mr. Thomas Kelly, a member of the defendant company. In reply to counsel's questions he said his firm in 1925 received a parcel of "Radiomicro Special" valves made by La Radiotechnique, the French firm from which the plaintiff company obtained its supplies; they were not in cartons but in wrappers. Mr. Terrell asked if he had received, since 1925, valves from France in boxes bearing a French inscription. Mr. Kelly replied in the negative. The valves he received were made in Holland and came to him through France. A man in France named Sassoon had supplied him with boxes, but not to his knowledge, with "Radiomicro" valves. Mr. Terrell then handed to him several Imperial Airways delivery sheets, dated in 1926, which, he said, showed deliveries to the defendants of parcels of "Radiomicro" valves, but witness denied all recollection of them and declared that the signatures on the sheets were not his. In one case, he said, it was his wife's, and another he could not identify.

The freight manager of Imperial Airways, Ltd., said that in 1926 he saw parcels of valves consigned from France to the defendants. The valves were packed in cartons bearing the word "Radiomicro" and other French words.

On May 12th, when the hearing was continued, Mr. MELVILLE, K.C., for the defence, said that Mr. Kelly had been able to find four delivery sheets of last year, some of which related to the delivery of "Radiomicro" valves. Evidence was given by two employés of the defendant company that they had never sold valves bearing the word "Dario."

Mr. DAVID CARTWRIGHT, a traveller for dealers in wireless goods, said he was in the defendants' shop when a man dressed as a chauffeur bought a valve. (This man is said to have been the employé of the plaintiff company who bought the alleged infringing valve). He did not know what he bought. He himself bought two "Radiomicro" valves, but he took no special notice of them.

The case was adjourned until May 18th to enable the plaintiff company's chauffeur, who was stated to have purchased an infringing valve, and another witness to be recalled.

### Theft of Electricity.

THOMAS H. SMITH was fined 20s. at Worksop last week for stealing electricity from the Butterley Colliery Company. The company, it was stated, supplied electricity to houses in the village of Ollerton. Wires were found to have been fixed to Smith's caravan, and electric light was used nightly in the caravan. Defendant admitted running a cable from his mother's bungalow to the caravan, and having a light for a week, but "he thought there was no harm in it."

### Taunton v. Tomlinson Lee.

IN the King's Bench Division last week, before Mr. Justice Rowlatt Mr. H. Tomlinson Lee, formerly borough electrical engineer of Wimbledon, was sued by Mr. Hugh G. Taunton, solicitor, who sought to recover £868 as his costs for acting as Mr. Lee's solicitor. The defence was a denial that defendant retained the plaintiff as his solicitor, and alternatively it was said that the costs which defendant was to pay the plaintiff were limited to five guineas.

Mr. Hawke, K.C., for plaintiff, said that when Mr. Lee relinquished the post of borough electrical engineer he proposed taking legal proceedings. He discussed the matter with Mr. G. E. Bellingham, a solicitor, who was a member of the Wimbledon Council, and wanted Mr. Bellingham to act for him. Mr. Bellingham, however, did not wish to do so, and introduced Mr. Lee to Mr. Taunton, the present plaintiff. The first action was against the Wimbledon Corporation for wrongful dismissal; the Corporation paid £138 into Court in settlement. Then followed a series of four actions for slander, &c., two of which ended in verdicts for Mr. Lee, while in a third the jury disagreed, and in the course of the fourth Mr. Lee changed his solicitor. Mr. Taunton acted for Mr. Lee in all these cases, but there was no doubt that a great deal of assistance was rendered by Mr. Bellingham. It was not true that plaintiff agreed to accept only five guineas for his services.

Mr. LEE said that Mr. Bellingham told him that he would do the necessary work on payment of his out-of-pocket expenses. Witness understood that Mr. Taunton was merely lending his name for the proceedings, and he understood from Mr. Bellingham that he would have to pay Mr. Taunton only five guineas. Several witnesses were called for the defence, who said Mr. Bellingham told them he was doing the legal work and charging Mr. Lee only his out-of-pocket expenses.

His LORDSHIP said that although Mr. Taunton did a great deal the real work was done by Mr. Bellingham. He thought that there was no promise by Mr. Lee to reward Mr. Taunton or Mr. Bellingham through him. He therefore gave judgment for Mr. Lee.

# Published Specifications.

**Compiled expressly for this journal by a firm of Chartered Patent Agents. The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.**

26,081. "Electrical primary and secondary cell." A. Dellino. October 19th, 1925. (Convention date not granted. Addition to 225,197.) (241,898.)
29,114. "Railway signal systems." Automatic Telephone Manufacturing Co., Ltd., A. E. Hudd, and A. E. Tattersall. November 18th, 1925. (269,008.)

**1926.**

712. "Electric current distributors." C. Campbell and British Tabulating Machine Co., Ltd. January 9th, 1926. (269,622.)
955. "Electric switches." A. B. Reeves and F. E. Minton. January 13th, 1926. (269,629.)
1,041. "Electric batteries." H. T. Harrison and G. Campbell. January 13th, 1926. (269,633.)
1,134. "Electrical gas-lighting apparatus." W. E. King and Gas Meter Co. Ltd. January 14th, 1926. (269,635.)
1,229. "Means of and apparatus for transmitting messages through submarine and other like cables." W. Estaugh. January 15th, 1926. (Addition to 233,124.) (269,637.)
1,291. "Electropneumatic valves." S. L. Glenn and E. E. Pierce. January 16th, 1926. (269,640.)
1,292. "Electropneumatic valves." S. L. Glenn and E. E. Pierce. January 16th, 1926. (269,641.)
1,294. "Push-button electric circuit-controlling devices." S. L. Glenn and H. S. Knox. January 16th, 1926. (269,642.)
1,348. "Methods of generating electrical and mechanical oscillations." W. H. Eccles and W. A. Leyshon. January 18th, 1926. (269,643.)
1,547. "Electrical voltage relays adapted for use with alternating or other fluctuating current." Igranic Electric Co., Ltd., J. H. Abbink-Spaink, and J. R. Taylor. January 19th, 1926. (Cognate application 5,200/26.) (269,646.)
1,565. "Charging of electric batteries or accumulators." C. G. Banister and Chloride Electrical Storage Co., Ltd. January 19th, 1926. (269,650.)
1,633. "Paper tape or strip saving device or means for telegraph and like instruments or machines." H. S. R. Murray. January 20th, 1926. (269,651.)
1,685. "Electric switches." J. Y. Fletcher and J. H. Collings. January 20th, 1926. (269,656.)
1,691. "Electric signalling apparatus." Favarger & Cie., Soc. Anon. January 24th, 1925. (246,478.)
1,695. "Gasfilled discharge tubes." H. Wade (Naamlooze Vennootschap Philips' Gloeilampenfabrieken. January 20th, 1926 (269,657.)
1,696. "Apparatus for the transmission of views, scenes, or images to a distance." J. L. Baird and Television, Ltd. January 20th, 1926. (269,658.)
1,886. "Inductance coils specially applicable for use in wireless telegraphy and telephony." J. K. Im Thurn and G. W. Harris. January 22nd, 1926. (269,668.)
1,922. "Head-lamps for motor and other vehicles." H. Drabble. January 22nd, 1926. (269,671.)
2,023. "Electric plug-and-socket connections." A. Reyrolle & Co., Ltd., and H. W. Clothier. January 23rd, 1926. (269,676.)
2,098. "Electrical connecting devices." F. Bourne and C. A. Bourne. January 25th, 1926. (269,679.)
2,263. "Electric motor control systems." British Thomson-Houston Co., Ltd., and D. E. Jewitt. January 26th, 1926. (269,684.)
2,264. "Moulded castings for electric lamps." British Thomson-Houston Co., Ltd., A. P. Young and A. G. Salisbury. January 26th, 1926. (269,685.)
2,266. "Tuning devices for radio receivers." British Thomson Houston Co., Ltd., and T. H. Kinman. January 26th, 1926. (269,686.)
2,873. "Variable pole windings for alternating-current dynamo-electric machines." Siemens Schuckertwerke Ges. February 2nd, 1925. (246,872.)
4,943. "Electric water-heaters or geysers." Benham & Sons, Ltd., and C. E. Hicks. February 20th, 1926 (269,704.)
5,064. "Electric discharge devices." Raytheon Manufacturing Co. and L. K. Marshall. February 22nd, 1926. (269,705.)
8,650. "Electrical tension indicator." Akt. Ges. Mix & Genest Telephon- und Telegraphen Werke. March 31st, 1925. (250,237.)
8,850. "Apparatus for drawing in electric cables." Callender's Cable and Construction Co., Ltd., and C. J. Greene. April 1st, 1926. (269,720.)
9,842. "Electric power plants." J. E. Calverley and W. E. Highfield. April 14th, 1926. (269,726.)
9,967. "Electric arc lamps." R. V. Boardman. April 15th, 1926. (269,727.)
10,860. "Process for the production of electrically insulating plates provided with a system of connections, more particularly ebonite plates for use in radio outfits." C. Parolini. April 24th, 1926. (269,729.)
11,521. "Electrical transmission of pictures or views." British Thomson-Houston Co., Ltd. May 27th, 1925. (252,696.)
12,064. "Electric switches." C. L. Arnold and M. K. Electric, Ltd. May 10th, 1926. (269,738.)
12,807. "Sound reproducer and method of manufacturing the same." Brandes Laboratories, Inc. October 8th, 1925. (259,535.)
14,078. "Galvanic baths." W. A. F. Pfanhauser and Langbein-Pfanhauser-Werke Akt. Ges. June 3rd, 1926. (269,753.)
14,532. "Protective arrangements for dynamo-electric machines." English Electric Co., Ltd., and J. C. Wilson. June 9th, 1926. (269,754.)
14,556. "Detachable barriers for high-tension electric conductors and apparatus." P. Nicholay. June 9th, 1926. (269,755.)
15,293. "Electric current switches." J. Brettmon. June 17th, 1925. (253,926.)
18,351. "Indicating means for use in charging secondary batteries." H. T. Harrison and G. Campbell. January 13th, 1926. (Divided application on 269,633.) (269,767.)
18,514. "Power factor control of electric systems." British Thomson Houston Co., Ltd. August 5th, 1925. (256,600.)
19,613. "Metallic cores for electro-magnets or the like." J. Y. Johnson (I. G. Farbenindustrie Akt. Ges.). August 9th, 1926. (269,770.)
19,911. "Means for preventing the burning of commutators and slip-rings of dynamo-electric machines due to excessive wear on the brushes." Siemens-Schuckertwerke Ges. August 13th, 1925. (256,978.)
20,784. "Purification of industrial zinc sulphate solutions preparatory to electrolysis." R. H. Stevens, G. C. Norris, and W. N. Watson. August 23rd, 1926. (269,776.)
21,363. "Gasfilled quenched-spark gaps." M. J. Purtschert. September 2nd, 1925. (257,928.)
22,178. "Treatment of zinc-bearing ores for the recovery of zinc by electrolytic deposition." Electrolytic Zinc Co. of Australasia, Ltd. September 17th, 1925. (258,575.)
22,572. "Electric light fittings or fitments." H. Sauveur. September 11th, 1925. (258,291.)
22,980. "Cooling of high-frequency electrical apparatus." C. Lorenz Akt. Ges. September 19th, 1925. (258,610.)
24,184. "Valve transmitters for wireless signalling." Telefunken Ges. fur Drahtlose Telegraphie. October 1st, 1925. (259,224.)
24,406. "Loud speakers." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. October 21st, 1925. (269,230.)
25,423. "Electric arc welding." Soudure Autogene Francaise. October 30th, 1925. (260,571.)
26,755. "Acoustical devices." British Thomson-Houston Co., Ltd. (General Electric Co.). October 26th, 1926. (269,804.)

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530. "Vibration indicators." British Thomson-Houston Co., Ltd. January 15th, 1926. (264,485.)
3,698. "Manufacture of electric incandescent lamps." General Electric Co., Ltd. July 6th, 1926. (269,828.)
6,903. "Television or like systems and apparatus." J. L. Baird. October 21st, 1925. (Divided application on 266,635.) (269,834.)

# New Work for Contractors.

**Particulars of new works and building schemes for the use of electrical installation contractors in search of work and all interested in the sale of electrical and allied plant and other products.**

***Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.***

ALTON.—Extensions Cripples' Hospital; Hampshire C.C.

AUSTRALIA (TASMANIA).—Artificial silk factory for Signors Allamel and Tanfani, of Celli, Bagley, Cusin & Allamel, Ltd., 92, Victoria Street, London, S.W.1.

AYRSHIRE.—Esplanade at Saltcoats for L.M. & S. Railway Company; company's engineer, Buchanan Street, Glasgow.

BARNSLEY.—Extensions, casual wards; Board of Guardians.

BEXLEY.—Nurses' home, Mental Hospital; L.C.C. architect.

BEXLEY HEATH.—School, Wickham Street, Welling, with electric heating, for Kent E.C.; education architect, Sessions House, Maidstone.

BOLTON.—Alterations, Rumworth Cinema; F. S. Hampson.

BRACEBRIDGE.—Extensions to mental hospital (380 patients), for the Visiting Committee; Harold E. Page, clerk, Lincoln.

BRISTOL.—51 houses off Whitehall Road; Bristol Housing, Ltd. 200 houses, Shirehampton; city engineer.

CARDIGAN.—Secondary school; Cardiganshire Education Committee.

CARLISLE.—Extensions, Central Hall, Market Street; H. E. Ayris, architect. Additions at Harraby Hills House for L.M.S.; E. H. Townshend.

CHESHAM.—Secondary school, for Bucks E.C.; C. G. Watkins, secretary, Aylesbury.

COBHAM (SURREY).—Additions, Fairmile Hatch, for Sir G. Rowland Blades, M.P.

DARTFORD.—Central schools (£21,000), for Kent E.C.; education architect, Sessions House, Maidstone. Engineering shop, Kent Road; Dartford Copper and Engineering Works. Additions, Hythe Street; Keyes Daren Mills, Ltd.

DERBY.—Catholic secondary school, Nottingham Road; Mgr. Payne, rector of St. Mary's.

DOVER.—Motor works and garage, for the Cambrian Motor Coaches Co.

DUDLEY.—Engineering shop, Pear Tree Lane; John Thompson, Ltd. Warehouse, High Street; A. Preedy & Sons.

DUNDEE.—Extension scheme at Ashludie Sanatorium (X-ray room, &c.), to cost £40,000; city architect.

EDINBURGH.—383 houses for Corporation; F. J. MacRae, city architect.

EPSOM.—Housing scheme (58), for the R.D.C.; F. A. Pratley, surveyor, Ashley House.

FALKIRK.—Church hall for Christ Church (£1,250); G. Smith, Christ Church Vestry.

GLASGOW.—Dance salon for Codanzo, Ltd. (£12,000); Denny and Blain, architects, 144, St. Vincent Street. Church in Beaconsfield Road for St. John's, Renfield and Hyndland Church (£2,500); Rev. James Muir, St. Andrews U.F. Church. Bakery and garages for Price Bros. (Bakers), Ltd., Clayton, Manchester; the manager. Garage, Kilmarnock Road, for Merryles Motors, Ltd.; J. Austin Laird, architect. Artificial light installation, Govan Town Hall centre; Medical Officer of Health.

GUILDFORD.—Extensions, County Hospital (£28,500); A. Preston, hon. secretary.

HARWICH.—17 houses at Rosebank, and 46 at Dovercourt; borough engineer.

HASTINGS.—Hotel, St. Leonards, with ballroom, garage for 100 cars and repair shop, and heating and electrical work; Callow & Callow, architects, 47, Havelock Road.

HEMSWORTH (YORKS.).—Infirmary, for the Board of Guardians; W. T. Lynam, architect.

LEEDS.—Corporation garage, Mansion Lane; S. Flockton.

LEICESTER.—Civic centre with municipal offices, and other public buildings; City Council Special Committee.

LONDON (BARKING, E.).—Outfall works (£21,000); L.C.C.

(BECONTREE, E.).—2,221 houses for L.C.C.; C. J. Wills and Sons, Ltd.

(ISLINGTON, N.).—134 tenements, George's Road area; L.C.C. architect.

(PECKHAM, S.E.).—Reconstruction, 138a, 140, 142 & 144, High Street; Selfridge & Co., Ltd.

(FULHAM, S.W.).—Buildings for Macfarlane, Lang & Co., Townmead Road; Troy & Co. Buildings for Hammersmith Distillery, Chancellors Road; J. W. Faulkner and Sons.

LONDON.—*Continued.*

(WANDSWORTH, S.W.).—Factory, Merton Road; G. Mason and Co., Ltd.

(WESTMINSTER, S.W.).—Alterations, Army and Navy Stores, Victoria Street; Sir Aston Webb & Son. Building, 11-27, Artillery Row; G. Jeeves.

(HOLBORN, W.C.).—Club for the Holborn Boys' Club (£7,000), for the trustees of the Harpur Trust, Bedford; the clerk, Bedford.

MACCLESFIELD.—Bazaar premises, Mill Street, for F. W. Woolworth & Co., Ltd., Kingsway, London.

MAIDENHEAD.—Reconstruction of Queen Street cinema; the proprietors.

MAIDSTONE.—Grammar school for boys, for Kent E.C.; W. H. Robinson, education architect, Sessions House.

MERTHYR TYDFIL.—Cinema, Castle Hotel site, for Frank Taylor; O. P. Bevan, architect.

MILFORD.—Sanatorium (£211,000), with electrical work, for Surrey C.C.; Sydney Tatchell, architect; Chapman, Lowry & Puttick, Ltd., builders, Haslemere.

MORETON.—School (£17,851), for Cheshire E.C.; director of education, Chester.

NORTHAMPTON.—Two operating theatres, for the Hospital Committee; the secretary.

NORTHERN IRELAND (BELFAST).—Extension to goods shed, Dufferin Dock, for Harbour Commissioners; T. S. Gilbert, harbour engineer.

(NEWTOWNARDS, CO. DOWN).—Conversion of Regent House into secondary school; C. J. Love, architect, 11, Chichester Street, Belfast.

OLDBURY.—Housing scheme (116), for the U.D.C.; surveyor.

PENRITH.—Premises, Old London Road, for Hayton's Motors, Ltd. (£8,000); James Winskill, manager.

PETERBOROUGH.—Housing scheme (50), for the T.C.; city surveyor.

PLYMOUTH.—Secondary school, Pounds Estate; Education Committee. Museum extension; borough engineer and Carnegie Trust. Landing stages, Stonehouse Bridge and the Barbican; borough engineer. Completion of Burrator reservoir (£30,000); water engineer. Badminton Hall, Eggbuckland Road; W. G. Gingell.

PORTSMOUTH.—Stores and stables, Brunswick Street and King Street; Portsmouth United Breweries, Ltd.

RIPON.—Sewage pumping plant, city engineer. 46 houses, Aismunderby estate; Williams & Williams.

ROTHERHAM.—Electrical extensions, factory; Guest and Chrimes, Ltd.

RUSHDEN.—County school of boot and shoe manufacture, for Northants E.C.; the clerk, Northampton.

ST. AUSTELL.—Garage, South Street by-pass; John Williams and Sons, builders.

SLEAFORD.—Electricity installation, motor works, Northgate; Allen & Sons. Electricity installation, Waverley Hotel, Station Road; H. Baker.

SOUTHEND-ON-SEA.—Church, for Leigh Road Baptist trustees (£10,800); A. J. Arnold, builder.

SPONDON (NEAR DERBY).—Extensions to artificial silk factory for the British Celanese Co., 8, Waterloo Place, London, S.W.1.

STIRLING.—Electrical work at 96 houses, Bannockburn Road; Mr. A. H. Goudie, burgh engineer (returnable deposit of £1). Electric lighting scheme, Poorhouse, for the Committee of Management of Stirling Poorhouse; J. J. Inglis, consulting engineer, Glasgow.

TORQUAY.—156 houses, Barton estate; G. E. Tozer.

TRURO.—Improvements, municipal offices; city engineer.

WALSALL.—Houses (83), for the T.C.; W. T. Emery, builder.

WATFORD.—Library, Little Nascot; A. Gold, architect, 14, Bedford Row, London. Extensions, factory, Stanborough Park; Granose Foods, Ltd. Extensions, Chester Road; Standard Range and Foundry Co. Market, Road; Standard Range and Foundry Co. Market; borough engineer.

WELLFIELD.—Secondary school, for Durham E.C.; director of education, Durham.

WEYMOUTH.—Shops and restaurants, Royal Bath site; Gutteridge & Gutteridge, for Messrs. Edwin Jones.

WORKSOP.—Extension, Picture House, Newcastle Avenue; Picture House Co.